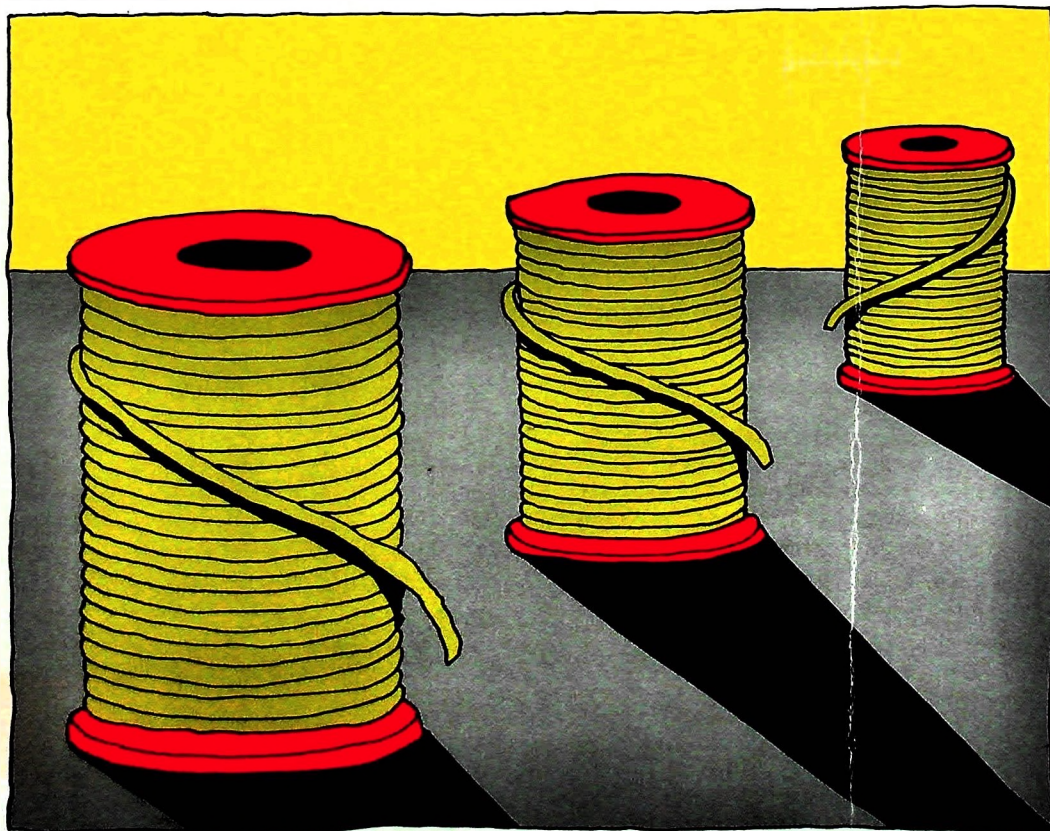LIFE BEGINS **AFTER** THE CONTRACT IS SIGNED

Secrets

of installing
a telephone system

How To Avoid The Pitfalls And Lessen The Pain

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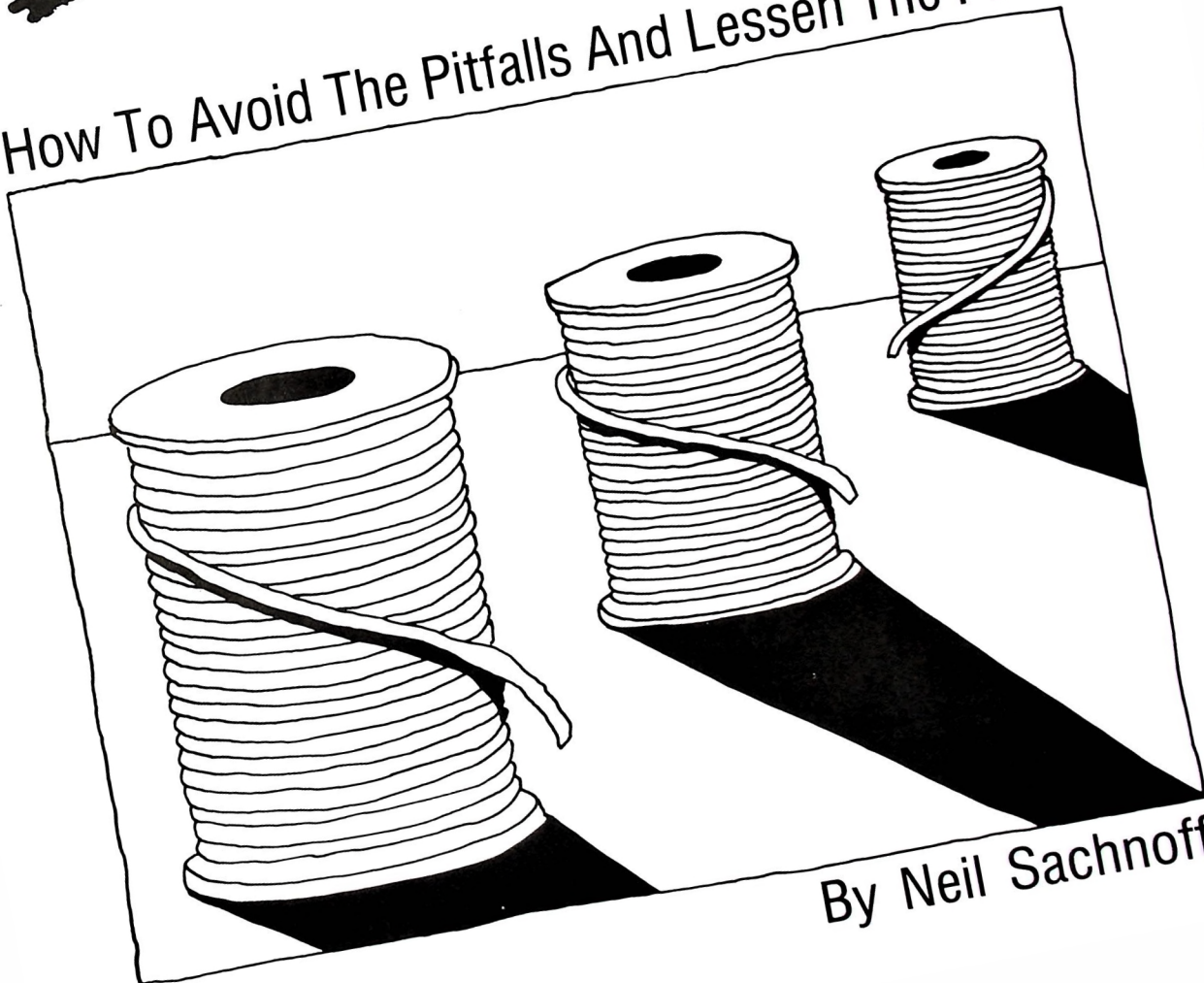
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Chapter 1.

INTRODUCTION

GENERAL BACKGROUND

On September 1st, 1988 Columbia University achieved one of its most important milestones in its modern history. The four year old Tele- communications Project was brought to its conclusion by placing into service our newly installed 10,000 line integrated voice and data telecommunications system.

This book "Secrets of Installing A Telephone System" was born out of this Project. My primary background till September 1, 1984 was in Management Information Systems (MIS), financial administration, general management and telecommunications. My familiarity of the University combined with strong technical and management background were considered a good skill set for the leadership role I would play for the next four years. With the Telecommunications Project completed and some hindsight, I believe that along with the University, I fared quite well and now know more about telecommunications and the installation process then I ever thought possible.

During the four years of the Project, I was responsible for every aspect of the Telecommunications Installation Project (TeleProject). This responsibility ranged from the initial data collection survey to come up with a picture of where we stood in 1984 to the development and issuance of the Request For Proposal (RFP), vendor selection and ultimately the system installation. During all phases of the TeleProject, I was constantly surprised at the lack of available information, advice and skills that were required to bring about a successful telecommunications project the size of the one we were attempting to accomplish.

However, the one area of the entire process that left its mark on me the most was the actual installation process itself. Not that the initial review of our telecommunications requirements, the development, issuance and review of the RFP, vendor selection and contract negotiations were boring or lacking in information. But these areas have their equivalent skill sets in other areas of business, engineering and MIS. There are also a number of seminars and books that address these areas in more detail than I could muster for a book. With the exception of a hired consultant, we could not find any definitive information to help with the actual installation process itself.

The actual Project installation was probably one of the most complex, largest and all encompassing projects the University has ever attempted. We could not identify any other project on the Columbia campus that actually involved every office, laboratory, classroom, dorm room, basement and street on and around the Campus and also required the active involvement of hundreds of University individuals. In addition to the University's staff involvement, not counting the vendor's subcontractors, our vendor had over 100 people actively involved at various stages with the TeleProject.

Much has been written about preparing for and negotiating a contract with telecommunications vendors. Contract negotiation is a critical process, one which has been given much attention in the media. However, once the contract is signed, the actual telecommunications system, including the cable plant and training, must be installed, regardless of how the contract reads or is interpreted. I have opted, after performing all these functions, to write about the installation process itself. Most of all, I have raised many of the issues and questions that we at Columbia University encountered and provide insight not only when our experience has proven somewhat successful, but where we also made mistakes. I believe that the chapter breakdown will help this book be appropriate for any institution undertaking such an installation.

The process of installing a large telecommunications system is one which requires the widest variety of skills you can imagine. From the skills required to construct a new building to rewiring a complete 20th century town with both very old and new buildings to becoming a congenial peace maker, bookkeeper, becoming an expert at asbestos removal/containment and many, many more skills. As customers, one of the underlying assumptions we make is that our selected telecommunications vendor understands and knows how to manage the very complicated installation process. This is only true to a certain extent from the vendor's point of view. As you will learn, the vendor's point of view is not always the same as yours.

The fact is, telecommunications vendors are experts in telecommunications, at least some are, some of the time, and not necessarily experts in the installation process. You will quickly realize that unless the vendor understands and excepts the fact that you are the expert in your environment, their experience and expertise alone will not get the job done to your satisfaction.

The installation process, which in our case took over 20 months, is a very difficult and tiring task under the best of circumstances. Your selected telecommunications vendor can make this already very hard and difficult process either easier or more difficult. One of your jobs is to help them make it easier for both of you, although they may not always see it that way. This book is intended to help you do just that. If you are a vendor reading this book, you will get a much better idea of the expectations of a large telecommunications customer. I believe that both the vendor and the customer can benefit greatly from this text.

On December 23, 1986 Columbia University signed a $13.5 million dollar contract with our telecommunications vendor for the installation of a new, modern voice/data, voice mail telecommunications system. The originally scheduled cut-over date was September 1, 1988, over 20 months away from the date the contract was signed. This book addresses what must be accomplished during that period of time, the installation process.

Every institution has its own way of reaching the point of signing a major contract with a telecommunications vendor. I have heard of the process sometimes taking years, and then when the final vendor is selected the decision is reversed over night by the Trustees of the company because of someone sitting on the Board. Sometimes the final decision is challenged by the vendors who have lost the bid. Compared to these war stories, we at Columbia were very fortunate. We laid out a game plan in 1984 when our decision was made to go forward with the issuance of our RFP and really never had to deviate from it to a large extent. Not that we did not have our share of war stories, but that is for another time and place. Were we just lucky or were we good? The answer is most likely a combination of the two.

"THE EARLY YEARS" section below outlines the basic history as to the events that lead to the selection of our vendor and the 20 month long telecommunications system installation. The actual selection process is not detailed, I'll leave that for another book, but rather, the chronological events leading to the ultimate decision are outlined. Further sections of the book will provide many helpful hints, suggestions and pitfalls to watch out for in the literally thousands of details involved in the installation of almost any telecommunications system.

THE EARLY YEARS

For many years the Office of Telecommunications had provided basic voice service via New York Telephone Centrex to the Morningside Heights campus while the Computer Center had been taking care of the University data communications needs. Up until 1983, the two departments had mostly worked independently of each other. Because the two departments were run separately there was little synergy of expertise or financial partnership. This separation of voice and data was not uncommon at this time.

The fact that the two areas were run separately was recognized as a long term disadvantage to the University as the potential technologies for voice communications became increasingly complex with the break up of AT&T, and newer and more advanced voice and data technologies were being developed. Neither the Office of Telecommunications which had traditionally relied on Ma Bell for almost all of its communications services or Data Communications which had no voice experience, were equipped to effectively manage these changes alone. Eventually, the Administration at Columbia decided to bring the Office of Telecommunications under the umbrella of the Computer Center where Data Communications already resided.

This first step in bringing data and voice operations closer together was accomplished in December of 1983. However, the Office of Telecommunications and the Data Communications Department were still operating as separate units reporting to different management within the Computer Center.

In the summer of 1984, the Computer Center was able to bring the Office of Telecommunications, Data Communications and Computer Operations under one Director for Support Operations. This position was filled in September 1984. The underlying reason for bringing voice, data and computer operations under one umbrella was the fact that the University saw the common functions of these areas coming closer together during the next few years. Further, as the University investigated alternatives to providing telecommunications and computer operations services, this organizational arrangement would allow for a smoother transition and better overall management of all telecommunications services in general.

There were several factors that led the University to the belief and understand that changes would be required to provide future telecommunications services:

COST FACTORS

The break up and divestiture of AT&T certainly made it clear that there would be significantly more competition for the University's dollar than there had been before. This was considered to be true across the telecommunications spectrum for voice, data and long distance services. The original financial idea in reviewing alternatives was not so much to reduce telecommunications costs, but rather the containment of future cost increases. We anticipated that we could increase the total utility of telecommunications at the University without significantly changing the overall costs.

NEW REQUIREMENTS

For the several years preceding this review, the Computer Center had experienced a literal explosion in requests for better, more and higher speed data communications. The requirements for greater connectivity to more hosts, faster connections, and anticipated requirements from dorm rooms were all moving very fast. Supplying enough of our own dedicated data communications lines was an ever increasing battle. We could not keep up with the demand by new Personal Computer and mini- computer owners to be connected into the University's data network. The demands for the dial-in and dial-out services were ever changing and increasing. Our leased data lines from the local telco were a constant problem and not as reliable as we would have liked to see. Higher speed telecommunications for use with super computers and high definition graphics were being demanded daily. We also recognized the student population as an untapped requirement for future data communications connectivity needed from the dorm room.

Further complicating the above was the fact that our current data switch and networks were almost 10 years old and reaching their maximum capacities and would require either costly significant upgrades or replacement.

Many of the University departments suffered from the "haves and have not's". Those departments or schools with good funding had multi-line telephone sets with advanced features while those less financially funded still had the old rotary type stations with limited features. The need to provide a better and more universally available enhanced service was also seen as a requirement for the future.

NEW TECHNOLOGIES

We anticipated a number of new and emerging technologies taking hold in the new era of telecommunications, that is, post AT&T divestiture.

Integrated voice and data networks were beginning to show up with more regularity. Better, bigger and easier to maintain PBX's were being developed and offered. Microwave systems, while already installed at the University, were getting less expensive and easier to install and maintain. Local area networks were getting better and being developed at a fast pace by a number of major suppliers. ISDN, although still not implemented, was seen as a desirable if and when made available.

The areas of voice messaging and voice processing were growing and being developed at a very fast pace. I had gone so far as to say in 1985 that "voice mail and voice processing will change the way the University does business in the not too distant

future." It turned out that voice mail and voice processing even exceeded my expectations in less time than anticipated. We anticipated the great utility and advantages of this technology and included it in our RFP.

The University itself was involved in future telecommunications technologies as one of the National Science Foundations (NSF) Center for Telecommunications Research sites and as a New York State Center for Advanced Technology Research.

CHRONOLOGICAL ORDER OF EVENTS

These three factors; Cost, New Requirements and New Technologies, and others led the University to believe that we could reasonably anticipate a change in our telecommunications planning strategies and systems in the not to distant future. To help plot and plan these changes the University formed a "Telecommunications Task Force" in 1984. The Task Force was made up of several Vice Presidents, Deans, and Directors from different areas of the campus.

One of the first items on the Task Forces agenda was to look for and hire a consulting firm to help us through the myriad of details and vendors we knew we would have to deal with. We were also cognizant of the fact that we did not have all the expertise required in house to undertake this venture alone and without some professional guidance. A brief "Request for Proposal" was developed for the purpose of selecting a consultant. In June of 1984 we signed a contract for consulting services with Telecommunications International, Inc. (TII), which was one of four respondents to the Consulting RFP. TII had at the time a considerable amount of experience consulting for educational/research institutions.

On September 15, 1984 the Telecommunications Project Director/ Director for Support Operations was hired to direct the areas of voice, data and computer operations while gearing up and preparing for the new Telecommunications Project.

In order to more precisely gauge the University's telecommunications requirements and to provide for the maximum amount of input, the Telecommunications Project Team developed a comprehensive questionnaire. On October 8, 1984 about 400 copies of the Telecommunications Questionnaire were distributed to various users, schools and departments within the University. Over the next several months the results of the questionnaire were tallied and analyzed. The questionnaire was supplemented by several weeks of intensive interviews with over 50 department and school representatives.

On March 5, 1985 the results of the questionnaire and the interviews was completed as a "Phase I Recommendation Report". This report detailed the University's requirements for telecommunications services and the possible alternatives open and their potential cost impacts. The primary recommendation of the report was to issue a Request for Proposal (RFP) for a new telecommunications system. This was based upon the competitive nature of the telecommunications market place and the factors noted previously.

University process required the TeleProject Team to submit the "Phase I Recommendation Report" to the Administration for review and approval. On May 13, 1985 submission of the "Phase I Recommendation Report" was made to the University Budget Committee with the recommendation to proceed with the development and issuance of a telecommunications Request For Proposal (RFP). After much discussion, the recommendation was finally approved.

Although our consulting firm provided a vanilla RFP for the University to start the development process with, it still took us over 5 months to fully develop the details of the RFP to our mutual satisfaction. This was one of the most pain staking events of the entire process. If the RFP did not represent the correct details and requirements of the University, the entire process could be a waste. However, with great pride but little fan fare, on October 25, 1985 the University mailed the RFP to 25 potential vendors. The University stated the purpose of the RFP quite simply:

> "It is the intent of the University to upgrade it's Morningside Heights campus voice and data telecommunications systems and, at the same time to contain and/or reduce its long term costs. The University expects to find via the RFP process a vendor whose total system approach will meet the University's short and long term telecommunications goals for a viable, technically sophisticated system within its financial constraints."

On February 7, 1986, in the midst of a snow-storm, we received eight vendor responses. The original respondents were from the following companies: GTE, Tel-Plus, IBM/Rolm, Northern Telecom, NYNEX, AT&T, Intecom and Bell Atlanticom. Fortunately for the University, most of the respondents had done an excellent job.

By mid-May 1986, based upon a complex matrix and technical review, we had made our first round vendor elimination and were working with our three finalists. All three finalists were invited to the University to provide detailed presentations and answer our questions.

The TeleProject Team felt that we could negotiate better from strength if the finalists knew that we were in a position to sign a contract at the completion of this selection and negotiation process. In an effort to help expedite matters, in June 1986 we requested and acquired approval from the University Trustees to negotiate and sign a contract. This helped to eliminate a potentially longer process later on and positioned us to move forward very rapidly.

The summer of 1986 was spent reviewing the remaining three vendors and performing site visits to their currently installed large customers and factory/technical reviews. There is definitely a right way and wrong way to perform these site reviews and visits, however, there is not time or room to address all of them here. However, I would strongly suggest at least two things to prepare for:

> 1 - Come with a detailed list of questions to ask all parties visited and write down their responses.
>
> 2 - Make sure your vendors understand that you will require some time with each customer alone, without the vendor present.

The first issue is one we give much lip service to, but because of time pressures and other events, may not do. However, it is vitally important that you come as prepared as you can to each site visit. The second, depending on who is paying for the trip, may elicit some complaints from your vendor. The site manager you are visiting may be a little bit more open with you if the vendor is not there looking over their shoulder.

In July 1986 the University made its primary vendor selection. For the next five months the University and our primary vendor went through a painstakingly long and hard negotiations process. The result of the negotiations was on December 23, 1986 when Columbia University signed a $13.5 million dollar contract with our vendor for the installation of a new, modern voice/data telecommunications system. The scheduled cut-over date was September 1, 1988, over 20 months or, 618 days away from the date the contract was signed. Now, as I was later to learn, the real work was to start.

To help the reader understand the extent of the TeleProject at Columbia University, I have provided below an outline of the scope of the Project.

SCOPE OF COLUMBIA UNIVERSITY TELECOMMUNICATIONS PROJECT

$16 million for total project;

- $13.5 million for our vendors equipment.

- This was our vendor's largest co-located installation in the country and the largest cable plant ever attempted.

- 7,000 plus user voice mail system, one of the largest co-located voice mail systems in the country.

- $2.5 million for space renovation and other construction.

- Renovation of over 10,000 square feet of space.

- Main switch and battery room.

- Remote switch room.

- Telecommunications offices.

- Vendor space for staff and storage.

- Student terminal room.

- Asbestos removal.

10,000 all new digital stations.

1,000 plus digital computer host ports.

200 port inbound/outbound modem pool. Completely rewire 75 buildings.

All new Feeder plant and cable tray system.

All station and riser wire concealed, most station wire installed in wire mold.

Over 13,000 A/B Jacks (voice/data), dual outlet;

- 8 pair (4 to a sheath) to each jack.

12 Manhattan street crossings, including Broadway and Amsterdam Ave.

2 on-campus trenches with a total of 28 conduits.

Installation work done in and around several Landmark buildings.

Over 6,000 miles of new cable installed.

Over 50,000 pairs to Main Distribution Frame.

Over 100,000 pairs of riser cable.

Over 100,000 pairs of station cable.

Coordinate project with over 300 Telecommunications Coordinators.

10,000 individual stations selected and designed.

27 co-located digital T1 trunks:

   192 Direct Outward Dial (DOD) channels.
   328 Direct Inward Dial (DID) channels.
   24 long distance service channels (Megacom).
   104 two-way lines, this was a first for our vendor and New York Telephone.
12 Foreign Exchange (FX) lines.

1 microwave system to 110th street and Broadway servicing 1 dorm and 1 administrative building.
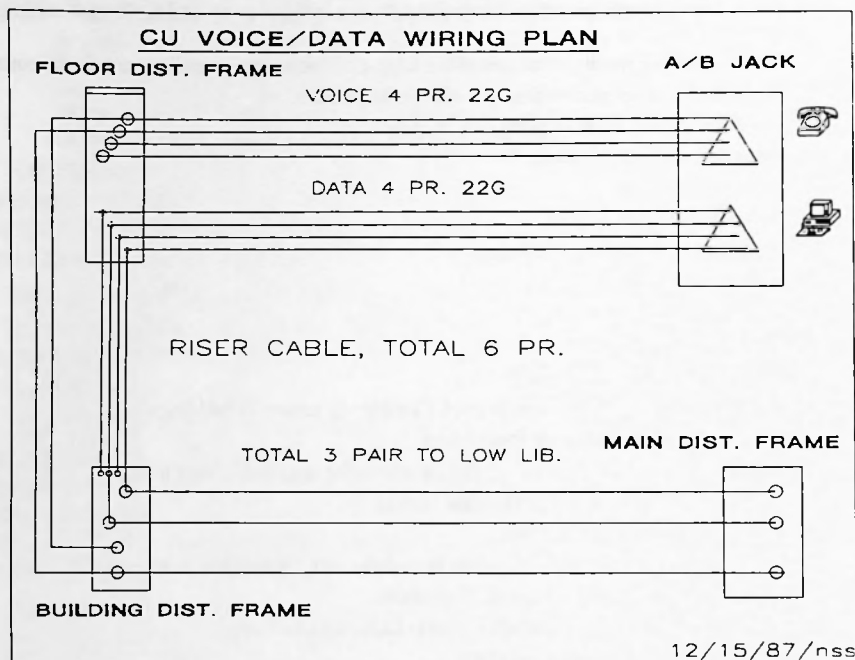
1 broadband system to 36 buildings.

3 new buildings coming on line at the same time installation was going on.

100's of individual renovations going on concurrently.

We attempted as much as possible to pre-wire the entire campus. A total of about 13,000 dual outlet jacks were installed. The main cable plant was designed as follows (see diagram):

- each jack had eight pairs of 22 gauge wire in a specially ordered Columbia Blue colored sheath with 4 pairs to a cable running to the Floor Distribution Frame (FDF).

- for each jack we designed 6 pairs of cable to run from the FDF to the Building Distribution Frame (BDF), the riser cable was also ordered as Columbia Blue.

- for each jack we designed 3 pairs of cable to run from the BDF to the Main Distribution Frame (MDF) which terminated on our switch room Main Distribution Frame.

CU VOICE/DATA WIRING PLAN

FLOOR DIST. FRAME   A/B JACK

VOICE 4 PR. 22G

DATA 4 PR. 22G

RISER CABLE, TOTAL 6 PR.

TOTAL 3 PAIR TO LOW LIB.   MAIN DIST. FRAME

BUILDING DIST. FRAME

12/15/87/nss

The cable plant design noted above would provide a number of long term advantages for the University. The three pairs that go back to the MDF would help shorten the time needed to make any changes to the new system, whether it be a change in location or a new station installation. The 8 pairs from the FDF to each jack would enable us if needed to break out pairs from the already installed jacks for additional stations in the same room or area without the need to run new station cables from the FDF.

To expedite this type of installation we devised a 4 way break out device we called a VIC (Very Important Coupler.) Actually, one of the University Managers, Vic Tiamsic, worked on and developed this device after I got the idea at a meeting I was attending, and so we named it after him. A VIC merely took the 4 pairs out of one of the dual outlet jacks and places the correct pairs to the correct pins so that a standard station from our vendor could be hooked up to it.

In addition to the above, we were working on plans to us the newly installed cable plant for local LANS with such systems as Ethernet, token ring and Appletalk. We expected the cable plant to far outlive the currently installed telecommunications system.

Columbia's telecommunications plan included having one of the nation's largest voice mail installations of any kind. The co-located 10 node system would enable the University to provide basic voice mail service to each faculty, administrator and researcher as part of their basic telecommunications costs. In addition, we are providing a basic voice mail capability to each dorm room on the campus as part of the students basic telecommunications system. As far as we knew, there was no other educational institution taking this approach to voice mail.

The inclusion of data communications capability at each station, in conjunction with the engineered cable plant, made the availability of data ubiquitous. Prior to the new telecommunications system, providing switched data communications was very time consuming, costly and, because of the limited access of the cable plant, sometimes impossible. With the new telecommunications system fully on line by the end of 1988, we expected to have over 1,000 host ports, 200 + inbound/outbound modems and over 1,500 data users with the integrated voice/data stations. We expected that the use of switched data communications through the new system would continue to grow for a long time.

The University installed over 3,900 digital stations in dormitory rooms. The inclusion of the dorms in the new telecommunications system with the new voice mail capability and the ability to have data in the dorm may very well have an effect on how the University delivers future education to the students. This will be left up to the imagination of the administration and faculty of the University. The inclusion of the dorms in the new system leaves wide open the future use and innovation of telecommunications in providing education and research.

The inclusion of an all encompassing telemanagement system, when fully implemented, would enable the University to better manage its telecommunications resources, including the huge installed cable plant. Columbia was counting on the use of the telemanagement system to provide overall control, management and provide the capability to make sound business and technical decisions about the system in the future.

The rest of this book is dedicated to describing the do's and don'ts of installing a telecommunications system. I had hoped that providing some background as to how Columbia reached this point would help place the installation process in the proper perspective. Each chapter concentrates on a particular aspect of the installation process. However, keep in mind that the installation of a telecommunications system is cumulative. All the chapters together result in a successful installation. A failure in any one of the areas can have an impact in another.

Perhaps with the exception of the chapter on "Dorms and Students" which are particular to colleges and universities, this book can be of help to almost anyone in almost any industry installing a telecommunications system.

Chapter 2.

GENERAL TIPS

Who is managing the Project.....?

You will find a recurring theme in this book. The theme is a simple one, you the client must take the position that you are going to manage the Project and in affect, manage the vendor and be responsible. This simple statement is the one over riding factor that I believe makes the difference between a successful installation and one that is marginal or worse, one that just fails. No one has more at stake then you and your company in the overall quality, cost effectiveness and timeliness of the total Telecommunications Project. This is not to say that your selected vendor is not committed to your Project and does not have a stake in its success, but your vendor's exposure pales compared to what you and your company have at risk.

You must make it very clear at the beginning of the Project that ultimate responsibility of decisions and process are yours. This is at times contrary to the way many telecommunications systems are installed or have been installed in the past by most telecommunications equipment vendors. A relatively standard practice has been for the vendor to be come in and manage the entire installation and hand over to the client a completed Project. If you take this position, you still may get a satisfactory installation, but certainly not one that will meet all of your expectations and special interests.

There is a delicate balance that must be struck between you and the vendor when taking this position. You do not want to arrange it so that the vendor has no responsibility for the success of the Project. Nor do you want to close your eyes to the process and the many decisions that must be made that can make a technical and/or financial difference in the Projects outcome. If your vendor has a good and knowledgeable Project Manager, your combined partnership and your participation can make a very effective team in the installation process.

Many of the chapters and ideas in this book are based on the theme that you must take charge, be involved and responsible and, a full partner in every aspect of the Telecommunications System installation process. As the various chapters will point out, only you will have your company's best interests in mind at all times when tough decisions need to be made. Although your vendors interests in many aspects will be the same as yours, how they accomplish them may no be to your best interests.

Who is managing the Project? You are, otherwise it is not being managed!

THE SENIOR CONNECTION

In 1984 the IBM Corporation purchased Rolm Inc. With 20/20 hindsight I should have seen what was coming. There is an old expression for what IBM stands for, "I've Been Moved". Along with this unofficial definition is the fact that IBM is known to reorganize to suit its position in the market place as it changes. This is just prudent management practice. With the acquisition of Rolm Inc. and the fast paced changes taking place in the telecommunications industry, reorganization within IBM and Rolm should have been expected as a matter of usual business. However, the amount and the extent of the changes that took place within IBM/Rolm over the term of the contract negotiations and the actual installation process most likely could not have been forecasted.

To understand the ramifications and time frame of this issue you should keep in mind that Columbia first sent out its RFP to IBM in October 1985, just about a year after IBM acquired Rolm. From the time the University first introduced IBM/Rolm to the Project till cutover was a full 2 years and 11 months. There was virtually no one actively involved on the IBM/Rolm Project team at the end of the Project that was involved when it first started.

Between IBM and Rolm staffers we had seen at least 100 people come in and out the Project door. Some of this revolving door of personnel was IBM's attempt to demonstrate to the University that they were going to utilize any and all resources they had at their disposal to make the Telecommunications Project a success. However, a great deal of the turnover was a changing of the guard because of pervasive reorganizations, promotions and re- assignments of staff involved with the Project. This made continuity very difficult for the University Project Team which remained very stable during this same time frame.

Our experience in this area was somewhat unusual in that every level of management within IBM/Rolm changed during the course of our Project. Not only once but several times. Not a single Rolm or IBM Vice President or Area Manager involved in the Project remained in the same position, or for that matter, Division, that they were in when the Project started.

The one saving grace was the IBM Project Manager. After the first one was released from the Project after 6 months, the second one remained on the Project through all the changes and reorganizations. However, our IBM Project Manager himself had gone through several management changes from the time he came on board until he left in January of 1989. The scope of his division had gone through a change and the managers he reported to had been changed several times. This required a re-education by him of his management staff on the Project as well as the University's share of re-educating the new team members. I wish I had recorded my first several discussions with the first set of new managers. It would have saved days of talking about things that all of the previous staff already knew. I would have saved many hours just playing back the previous discussions.

What do I recommend for you? How can you prevent or take measures to try and prevent this whirlwind of personnel and organizational changes? Your vendor should take the steps to identify at least one high ranking individual within the appropriate area of the company who will take responsibility and hence ownership, for keeping YOUR Project going and who will meet with you on a regular basis. Meeting with you

regularly can not be underestimated. Without meeting on a scheduled basis, a minimum of once a month is absolutely required. Otherwise this senior person will soon get sucked up into other company projects and not have a hands on or working knowledge of your Project. Remember that you are your highest priority and that your vendor may not have the same inclination.

This person should be high enough in the organization such that minor reorganizations of the vendor's company does not interfere with your relationship and him/her. This person is your known resource for when things are not going well and they have the resources and authority to make decisions and get things moving. Your Project will very likely take a year or more, there will be turn over on both the vendor's project team and perhaps your own, you need someone who will be around to see you through the entire Project.

I believe our experience in this regard had been quite an unusual one with respect to timing. The recent acquisition of Rolm by IBM in 1984, when we sent out our RFP, the quickly changing telecommunications environment and the fact that IBM/Rolm were in the mist of developing the 9751 all contributed to the rapid turnover of staff and management and the constant restructuring of IBM to absorb the Rolm organization.

Although I note the situation as unusual at the time, buy outs, reorganizations and fast paced changes continue in the telecommunications industry. AT&T, Northern Telecom, TelePlus, the RBOCs and all the others in the industry are also subject to the same environment and are apt to change. Identifying this corporate senior level person is your protection that the interest and commitments made during the contract negotiations and sales pitches/promised are honored and followed through during the installation process. Do it!

(Side note, the preceding subject heading, "The Senior Connection" was written prior to the announcement by IBM in December of 1988 that they were selling the Rolm manufacturing and development divisions to Siemens of West Germany and developing a joint venture with Siemens called Rolm Company for marketing and service. This is continued proof of the volatile telecommunications market place. Now more than ever the need to identify a senior officer is a critical need in any large telecommunications project.)

A PICTURE IS WORTH A 1,000 WORDS

One of the most time saving and generally useful items we purchased for the Project was a Polaroid instant camera and plenty of film. The instant picture capability saved both the University and our vendor's project teams hours of running around inspecting various areas and details of the installation. By bringing pictures to meetings and using them as documentation of problems and difficult installation areas we were better able to communicate and be effective as to what had to be done to correct or fix a situation. The pictures were also an effective way of documenting problems for future reference. The phrase "a picture is worth a 1,000 words" was never as true as it was for our installation. The instant camera became a vital piece of the installation equipment. A close up adaptor is also a good investment.

If you are installing a new cable plant and jacks, building or renovating a switch room, performing street crossings, installing microwave equipment or any other major work related to the Project, an instant camera is must. You may also want to consider using a 35mm camera for the production of slides for presentation purposes.

ONCE IS ENOUGH!

If you are in a co-ed educational setting with student dorms or with women on the campus or your company has women working on the premises where much of the installation work will be taking place, you should insist that your vendor agree to have a "no second chance" clause with their staff and subcontractor. A no second chance rule says that "any person on the vendor's project team accused of harassment or any misconduct will be immediately and permanently removed from the job site." This does not necessarily mean that the offending party is dismissed. This may seem like a very harsh sentiment, however, it does avoid lengthy and generally unpleasant conflicts if the harassment or misconduct issues arise. As we discovered, this rule is much easier said then done. There may be those in your organization that may take advantage of such a rule. You must be aware of the rule's shortcomings and deal accordingly. With the choice of having or not having a no second chance rule, I would strongly favor its inclusion.

In addition to the above, it needs to be made absolutely clear to the vendor and their subcontractor that drinking alcoholic beverages, including beer and wine will not be tolerated on the campus or the corporate premises during their working hours. The last thing your Project needs is to have an overly energetic installer or technician start making passes at some of the co-eds or women in your company. You will receive enough bad press just by having the installers there without adding to it.

Your vendor may not be able to officially agree to this policy in writing because of Union rules or other issues related to it. If you can not get it in writing, at minimum you should try to have a verbal understanding on this subject.

ORGANIZATIONAL CULTURE

Your company's organizational culture is very important to you and the success of the Project. Often times you will take into consideration the nuances of your company when making decisions about the Telecommunications Project and how certain things are done or whose permission is sought. You will and do care greatly about your own organizational culture because you understand your firm's importance, operation and place. However, your vendor at times will certainly not understand the importance of your organizational culture and more often than not, may not care. Often the fact that they do not care is not out of indifference rather they do not believe it exists or take the time and effort to understand it. They are generally just not trained that way.

One of your roles is to work with your vendor and to sensitize them to your organization's cultural nuances. At the very minimum you will need to direct and guide your vendor around the organizational culture so as not to fall prey to its negative side affects. Constant diligence is required in this area. Even those of us who know our own organizations at times fall prey to its cultural nuances. With a major telecommunications project to accomplish, you are bound to break some rules and go head to head with a number of people. One of your goals should be to keep these conflicts down to a minimum by working with your vendor.

At one point in our Project we had spent a great deal of time working with a particular Dean and the problem of getting our feeder cables installed in the basement of a building he was primarily responsible for. After several weeks of discussion and compromise, our vendor, without the University's permission or knowledge suddenly installed a cable tray in the basement of the building we had been discussing with the Dean. Unfortunately for us, we found out about the installation from the Dean's office who were very upset about the cable tray installation prior to their official approval of its location and size. We lost a great deal of good will and trust from this small episode that our vendor could not recognize as a factor in the total installation. We most certainly did recognize the difference in later aspects of the installation.

In almost any large institution, an installation of this size is like working under a conglomerate. We had 17 schools and Deans to satisfy, not all of which felt the same way about the installation or the necessity of the new telecommunications system. Further, as in any organization, not all Deans are created equal. Knowing and understanding the corporate culture is a very important factor for both you and your vendor for the installation to be a success.

An issue that is closely tied to organizational culture is your vendor's understanding of the business that you are in and what happens at your premises on a daily basis. For example, your vendor may not realize that in an educational institution, classrooms are used for most of the day and evening for classes. They will forget to schedule around these classrooms and try to install the cable plant while the classrooms are in use. The students will love you for this, especially around mid-terms and finals.

Or, your vendor may also not recognize that labs actually have experiments going on inside them and turn switches on and off as they go around the room installing the new cable plant. So what if a 5 year experiment is ruined. Get the idea?

This issue of knowing and recognizing what is going on in your organization is just as true for a law firm or a construction company as it is for a University. Where are the meeting rooms and when are they most often in use? Where are stores of toxic materials that should be avoided, if not accompanied by company personnel? Your vendor needs to be attuned to your work place, environment and special needs.

KNOW THY VENDOR.

As with any organization, the quality of your vendors personnel will vary. Try and recognize your vendor's staff strengths and weaknesses on the project team. If you perceive that there are weaknesses or for whatever reason discover specific weaknesses in any of your vendors staff, bring them to the attention of your Project Manager and have the vendor fill the void or weakness to your satisfaction. Hopefully you have contracted in your agreement for the right to approve the vendor's project team and that your requests will meet with the appropriate action on their part. You need to take this action as early as possible, the longer you wait the harder it is for the vendor to take someone off the project and find a suitable replacement. Good, competent people are hard to find. Try to keep the ones you get.

Another reason to take this action quickly is the damage the person or persons can do to the Project in just a short time. I am not discussing overt or even covert damage, but those things that they may do because of incompetence that come back to haunt

you later on. If a cable plant designer has no concept of your campus wiring design plans or the system design manager knows less about the system being installed than you do, you are building up future problems the longer they are on the job.

Manuals, manuals, manuals. You would assume that your vendor has quick and easy access to their own library of manuals for all aspects of their telecommunications system, do not be surprised if they do not. Further, you can not assume that the manuals your vendor does have are the latest versions of the system manuals or that they even fully understand how the system works. Be prepared to make many copies of what ever manuals you can get your hands on, and be a pain for those that you need and they can not get easily. Persistence pays off in this regard. Start building your library early and keep it up to date.

One of the first things you should do upon signing the contract with your vendor is to ask for all the most recent system and peripheral manuals up front. You will also need to keep asking for the updates to the manuals during the course of the Project. If your vendor has a customer distribution list or center for its manuals and updates, get on the list as soon as possible. When making this particular request you may run into the old excuse of "you need to take the training course first before we give you the manuals." Do not accept this excuse for not getting the manuals, even if you have to pay for them.

Read the documentation that pertains to your system. You'll be very surprised to find all the information that is contained in the manuals and technical documents. If you take this extra step, even if you do not understand all of it, you will be in a better position to discuss details with you vendor and ask more intelligent questions. One thing I discovered is that the vendors staff often do not review the manuals after they have read them the first time, if at all. And if they have read them, it was generally a long time ago. They often rely on experience, meetings and working with their company's experts to get information and keep up to date. You will be a leg up on them if you have read the latest documentation.

Your vendors staff can not really be strongly blamed for this attitude. The telecommunications industry is moving so fast and there are so many changes occurring on a daily basis, even in the smallest of companies, it is very difficult to keep up with the changes and documents that are prepared for this purpose. However, this is no excuse for you not to at least go through the manuals and documents at least once. What you glean from them can often make the difference in critical decision making situations.

Having read and attained a somewhat working familiarity with the vendor's manuals provides another advantage to you. It allows you to perform what I call a "smell test" on the information your vendor provides to you. Your vendor's information will not always be correct. Even on the very technical issues relating to your new system. You need to be able to question information and provide some basis for taking the particular issue further if you do no feel comfortable with what you have been given or told. It is often a good idea to have information checked and verified with corporate headquarters. We found that many times information originally provided by the installation team or local support staff turned out to be incorrect or only partially correct when checked with the home office. The ability to question and make queries is a very important one to retain.

A little information can be a dangerous thing, so your vendor may think. Unfortunately, your vendor may try keeping information from you because they may think you just can not understand the nuances of their system (why is it so complicated to begin with?). If found out, your vendor may claim that they kept this information from you for your own good. Although your vendor's intentions may be good, there is no legitimate reason not to tell the customer the important facts about an issue if asked.

Just as important, if the right question is not asked, your vendor should be attuned sufficiently to you and your organization to bring up and offer information that can make a difference to your company. The last thing you want is to be covertly protected from yourself. Generally speaking, if the vendor has a concern about something and explains it correctly, a little information is not a dangerous thing. Let your vendor know that you are capable, ready and willing to speak and communicate with them on any and every level. Often times you are not as dumb as you think and they are not as smart as they think.

We had one instance where our vendor told us that we could only have "X" many tables for feature tables when there were actually many more available feature tables in the system. They were concerned that if they told us the true number that we would assign all the available feature table capacity of the system up front during the installation process and not leave any room for future growth or changes. We explained that we understood the reasoning for not using all the feature table capacity up front. What we did not understand was why they mislead us or kept the real total feature table number from us. If it is easier for them not to tell you then to explain it, they may keep it from you.

This situation does not quite constitute lying. There is a "Catch 22" here. If you really do not have the right technical skills on staff to understand and act accordingly on information provided, you may still find yourself in the position of your vendor trying to take actions in what they believe to be in your best interest and not letting you know why.

Good telecommunications personnel are still a relatively scarce commodity in many parts of the country. To make sure that the ones assigned to your Project will remain, check to see if your selected vendor has any other large installation projects going on or pending in the same region as yours and the status of those projects. You may find that in a fix your vendor will take the staff assigned to your account and either temporarily or permanently off the job to fix emergencies or problems at other accounts. This practice, although disruptive, is not necessarily always that bad. If you should find your Project in trouble you would hope that similar resources may be reassigned to you. The trick here is getting, and not giving, too much.

While discussing your vendors staffing resources, always keep in mind that one of your vendors objectives is to do the best adequate installation job they can with the least amount of staff and at the least cost. They may never out and out tell you this, but it just makes good business sense. Although your vendor may be loath to admit it, this business philosophy may result with them providing inadequate staffing levels at the start of the Project to meet the intended dates and milestones.

This is a critical point to remember when reading the chapter on meetings and management reports. If staffing levels are not adequate to meet your agreed upon dates, you will want to identify this problem as soon as possible during the installation process

so that corrective actions can be taken in time to meet those dates. Depending on when these corrective actions are taken, they can make what is already a very difficult process even more so. Adding more staff and providing for longer days because the Project has fallen behind have their own set of problems associated with them.

There is a subject that I never have understood, and still do not. When you signed your original telecommunications contract you had a base system for both the telecommunications equipment and the installation material. You may also have contracted for an Add/Delete Price list. However, it always seems to take forever to get a new price quote from your vendor for changes that occur during the installation process. Unfortunately, the company policies and practices may prevent you from getting the pricing you require for decision making on a timely and accurate basis. The method in which your vendor develops pricing may also be a deterrent from getting it quickly and accurately.

This issue of requesting and receiving new or updated price quotes is, very likely, vendor dependant. However, you should keep in mind that the process can be lengthy and at the end of the process the information provided may still be incorrect and not what you had originally requested. If your vendor can provide meaningful, quick and accurate pricing information, you have hurdled a great barrier to taking care of business.

How does your vendor's management communicate information down the line to its staff and sub-contractors? Test the process to see if it actually works. On many occasions we had made arrangements and agreements on process or details to discover time and time again that the staff required to carry out the work were never appraised of the information. By the way, the same thing may be true for your own organization, test the process both ways.

HAVE YOU DONE THIS BEFORE?

Sounds like a silly question, doesn't it? Well it's not as silly as you may expect. The basic skill set for the vendor's Project Team may be the same for doing a 500 line installation as it is for a 1,000 line system. However, there is a significant difference in the management and complexities of doing a 5,000 line or 10,000 line system than there is for a 500 or 1,000 line system. Not the least of which is the sheer volume of data and materials that make the overall coordination much more different. Your job is to make sure that your vendor understands that the skill set and the management tools necessary for the 10,000 line installation is different then the 1,000 line system. Do not trust them to understand this even if they tell you they do. If their approach is the same for a 10,000 line system as it is for a 1,000 line one, you're in deep trouble. You will find many examples in this book that you can look out for that distinguish between a large scale installation versus a small one.

Make sure, as best you can, that your vendor's installation team, or at least the Project Director and Project Managers, have had experience installing a system of your size and complexity, preferably in a setting similar to yours. **It is NOT sufficient that your vendors company has done large installations similar to yours, it is the staff assigned to YOUR project that is important.** If the assigned staff does not have the experience coming into your Project, you must assume that an already very difficult and hard process will be made that much harder and more difficult as they gain that experience at your expense. Again, this book is partially dedicated to the asking of the right questions and keeping all involved parties honest and on their toes.

One difference I like to point out is that with a very large Project, you have to "manage it." To manage the Project takes a particular tool box of skills that are not the same as the skills needed to "run" a smaller Project. The difference may be subtle, but important.

STAFFING: YOURS

Columbia University, prior to the start of installing the new telecommunications system had been a long time customer of New York Telephone Centrex service. The staffing requirements for running a Centrex based system did not require either a very large staff nor a very technically inclined staff. For the most part, our local telco took care of the technical matters while our office's responsibility was to place orders, balance the network and provide a billing mechanism. Neither of these circumstances was out of place for the way the market place had handled telecommunications prior to divestiture. As a matter of fact we were quite typical.

With the advent of the Telecommunications Project, all this was to change. The Telecommunications Office and myself found ourselves not only spending almost all of our time working on the new Telecommunications Project, but continuing to run the day-to-day Telecommunications Offices as well. How you balance this problem is very much dependent on your organizations financial position and the overall understanding of what it takes to install such a system. This book can not address your organizations financial position, but certainly will provide a very good idea of what it takes to install a new telecommunications system from scratch.

At the very minimum, your organization should have a full time dedicated Project Manager whose primary responsibility is to work with your vendor and the vendor's installation teams. How many additional staff members you dedicate to the Project is dependent on many other factors that must be taken as a whole in order to decide this question.

- How large is the actual installation in terms of stations and trunks? A 1,000 line system should utilize fewer resources then a 10,000 line system.

- Are you re-using the installed cable plant or installing a new one? How much outside plant work is involved, street crossings, microwave systems, CATV, trenching, cable tray installation?

- How large is the physical installation? Is your environment one large building where you are always in close proximity to the work being done or several buildings spread out on a large campus? Although you may not realize it, traveling around a large campus can take up a large part of your time.

- Are all the buildings new, old, both? Are they considered wiring nightmares or dreams?

- Do you already have a switch room built or are you starting from scratch to build one? Are you building more than one?

- How many staff is your vendor dedicating to the Project? How many crews do they expect to be working on the campus at any given time? Besides the vendors Project Director, how many more managers have they assigned to the Project?

- Before the Project actually started, were you already understaffed for the normal day to day affairs of your Telecommunications Office? If so, this situation is only going to get worse.

- How long is the Project expected to last; weeks, months, perhaps years?

- Did you originally budget for Project staff when submitting the Telecommunications Project for approval, or did you commit the first sin and assume that you had the staff already on board and that was all you would use?

All of these items must be taken into consideration when determining your own staffing levels for the Project. The norm is that you underestimate the level of both you and your staff's involvement and have to make up for it later. However, if you read this book, you will have a much better idea of what is expected and needed for a successful installation and may bypass this first sin.

Because the Project is likely to last 12 or more months, you will need to consider how you will handle vacation time for your staff and even that of your vendor. I have learned one simple truth, there is never a good time to take a vacation or be away from the Project. There is always something going on or on the horizon that requires either you or your staff to be around. However, it is of critical necessity for you, your staff and that of the vendor to do just that -- take time off and get away from the Project.

If your Project is anything like that at Columbia, you will be constantly in high gear and confronting major issues and problems daily. The pace will be very demanding and impossible to keep up with for an indefinite period of time. Hours turn into days, formal lunch hours become a thing of the past, weekends and evenings become an extension of the Project. As difficult as it is on the staff remaining when someone is out, time must be scheduled for vacations. You need to let your staff out of the pen to rejuvenate and come back to the Project ready to pick up where they left off.

This idea of forcing a vacation also applies to yourself. Do not fall into the old story of, "every time I am out of the office I pay for it when I get back." Even if it is true, you can afford this syndrome more then not taking the time off.

EXPRESS/SPECIAL PURPOSE CABLES

Once you have decided to re-cable your entire campus or building you should tak advantage of this once in a decade, or how ever often it gets done in your organizatior event. You will have very likely specified out all the details for your telecommunications systems cable plant itself. However, this will very likely be your enterprise's last chance to install those special and express cables for those departments with special needs and requirements. As you will learn later, cable installation is noisy and messy, so why not take the sting out of the installation of other cable needs now rather then wait for later? Further, if the additional cable plant can be installed at the same time you are installing your base telecommunications system cable plant, you may be able to negotiate a better cost. We recognized the opportunity to capitalize on this issue and did several special cable runs during the installation:

- We installed an express cable directly from the switch rooms Main Distribution Frame (MDF) to our Security Office. This was terminated on its own Floor Distribution Frame (FDF) dedicated for the Security Office. We estimated that we would save the cost of the cable in less then a year by transferring a number of Telco alarm circuits to the newly installed cable plant. This extra dedicated feeder cable to the Security Office will also facilitate alarm and security device installations in the future.

- We installed a dedicated express cable directly from the switch room MDF to our Facilities Management Office. This to was terminate on its own dedicated FDF. We saw the use of telemetry growing and the use of the cable plant to monitor environmental control systems.

- Several schools on the campus had us install dedicated plant feeder cables from a building's Building Distribution Frames (BDF) to their own departmental computer systems. They were going to use the cable plant for their own data communications networks or LANS.

- We took the opportunity to install extra pairs across each and every street crossing, including extra empty conduits.

- As with any large campus setting, there are almost always plans for new buildings or expansion of existing ones. We took the opportunity to install several dead end feeder cables in as close proximity to where we knew new buildings were being planed.

The increase in our overall cost to accomplish these installations was minimal. The pay back will be recognized for years to come.

WE'LL TAKE CARE OF IT

Don't ever let your vendor get away with saying they will do something or take care of it, whatever "it" is, without your following up with:

- Who specifically will be responsible for it?
- How will they do it or take care if it?
- When will it be done?
- How will we be notified that it was done?

If your vendor is smart, they will hold you to the same level of responsiveness as you demand of them. If you both keep to your part of this process, the entire installation will benefit.

Each chapter in the rest of the book concentrates on a particular aspect of the installation process. You will continue to find dozens of ideas and helpful hints to help make your telecommunications installation easier and ultimately, more successful for you and your organization.

Chapter 3.

MEETINGS AND MANAGEMENT REPORTS

There are many ways in business in which we communicate with each other. There are letters and memos, electronic mail, telephone conversations, voice messaging, facsimile, and the use of intermediaries to carry messages back and forth between interested parties. However, sooner or later we usually will need or insist on meeting with each other face to face. When there are hundreds of constantly changing details to carry forward from week to week and a variety of personnel involved as there is with your Telecommunications Project, the only way to handle such things is to meet with the persons that are involved with the Project with you.

During the course of your installation you will have more meetings than necessary and spend more time than you should doing such things as talking, arranging, assigning, following-up, arguing, scheduling, and throwing the bull. This chapter is not intended to tutor you on how to run a meeting or write a report, there are many excellent books already written on these subjects. Rather, I intend to outline for you those ideas that work in making what ever meetings and reports you do have more productive and focused to the tasks at hand.

A very important aspect of holding meaningful meetings is having documentation that is correct for the stated purposes. I will also discuss those reports and reporting schemes that will help both you and your vendor understand what you are doing and where you stand in doing it. Pretty simple, if your mind is thinking straight. However, as the installation progresses, not all minds will be thinking as straight as they should be or on the subjects that require the time and effort.

WEEKLY MEETINGS:

Not all weekly meetings are created equal.

At the beginning of most installation projects there is a great deal said about the "Weekly Meeting." The weekly meeting has become such an ingrained part of the installation process that in negotiating for telecommunications systems the subject often finds its way into the contract. Where and when the weekly meeting will be held, who will come and who will take minutes? The fact that the weekly meeting has attained such a point of high prominence is easy to understand. The complexities of an installa-

tion necessitate getting together frequently so that all parties can be up to date on the current set of actions being taken and the associated problems. There is often much to be communicated between the vendor and the customer.

It is these facts, the complexities and amount of information exchange, that brings me to the first point of weekly meetings; Not all weekly meetings are created equal. As a matter of fact, I believe that the weekly meeting has outgrown itself.

The Table of Contents of this book could easily act as a guide as to the type of information that may be covered in a conventional weekly meeting. However, during the height of an installation, when all these activities are going on concurrently, you would need a classroom and several tables to hold all the individuals and charts and drawings necessary to accomplish anything at a meeting as currently defined.

The first recommendation in arranging for the weekly meeting is; not to have it. At least not after the first few. Instead, you need to arrange several regularly scheduled meetings that cover particular aspects of the installation process. They all do not have to be weekly to be effective. Some meetings can start out every two weeks, then weekly and back to every two weeks when the peak period has passed. If done properly, you can arrange for smaller, better and easier to manage meeting settings that can concentrate on the details of the particular subject at hand. Although for continuity purposes, there will be some common parties to some of the meetings, the meetings in general should not end up wasting the time of those attendees that did not have to be there to begin with.

Another advantage of these special purpose meetings, they can be scheduled for shorter periods of time. We found that our regular weekly meeting, prior to breaking it down as noted below, ran into marathon sessions. One subject would run into another and several hours later we were still there with a list of items to still talk about. Below are the meeting groups we eventually ended up with. Your particular circumstances may well dictate a somewhat different approach, depending on the size of the installation, the number of staff involved and actual items contracted with your vendor. You may need more or fewer meetings. The point is to review the Project and determine the optimal approach for you and your vendor.

Inside/Outside Plant Installation. These meetings revolved around the nuts and bolts of the actual cable installation. The inside and outside plant Project Managers worked out the many details and scheduling of the activities needed. When necessary we would invite different parties from around the campus to participate. For example, when doing the dorms we invited the Residence Halls staff to help with the scheduling, or if discussing asbestos we would invite the Health and Safety Office staff.

Marketing. We developed a group that started to meet in order to separate contract and marketing discussions from those staff that were doing the actual installation. We called this group the "Non- Installation Team" (NIT) since the other meetings were considered installation meetings. These were often discussions revolving around contract intent, pricing of vendor equipment and general configuration models. All these issues usually fell under the auspices of the vendor Marketing Team and not the vendor group doing the inside/outside plant.

Design. The design meetings revolved around a number of issues; we answered questions and policy issues raised by the Telecommunications Coordinators during there normal process of interaction with the Project, this is where the Feature Package

design issues were resolved, the system parameters for both the switch and the voice mail system were assigned to this group and this is where the University asked all the questions that pertain to feature use and availability. We discovered time and again that what was thought to be obvious was not always so. The ability to concentrate on the Design issues was a critical factor in our success. You may find it helpful during these meetings to have a switch engineer present to provide answers to questions immediately instead of waiting for the next meeting. The Designers are generally not engineers.

Data. If you are going to be using your system for switched data communications, you will need an entirely different skill set at the meetings to discuss these issues intelligently. Things like Hayes compatibility, inbound and outbound modem pools, pin outs, software compatibility, data classes of service and data groups, smart modems versus dumb modems and the use of Authorization Codes do not always work the same way as the voice side of the switch does. You require the skills from the vendor that can speak about data authoritatively, otherwise you run the risk of making many incorrect assumptions that can throw your entire data implementation off of schedule. There is a very good cover story article in the October 1988 issue of Data Communications Magazine, pages 129 - 157 that outlines the many aspects of the data capabilities in our vendor's switch that had to be taken into consideration before it would operate appropriately for our environment. Our view of the data side and how it should operate was significantly different then that of our vendor, at least at first. I believe you will find the data implementation to be very different vendor to vendor.

Telecommunications Management System. One of the most important and least understood aspects of the installation process is the implementation of the Telecommunications Management System. This is the MIS computer system that keeps track of the management, billing, equipment, cable and inventory aspects of your system. The skill set required to successfully have this system installed correctly and timely is much different then that required for most of the other aspects of the installation, including data noted above. The chapter on this topic will more fully discuss it.

Aside from the regularly scheduled meetings noted above, there are always many more special and ad hoc meetings and working sessions held outside of them. They may range from how you are going to perform training to the status of the microwave installation. You and your staff will arrange these as is needed.

You should not count on the regularly scheduled meetings to replace the many working sessions that revolve around them. Most, if not all, issues addressed at the regular meetings generally should have been discussed first in some other forum. If your regularly scheduled update meetings are also going to serve as your working sessions, you may be leaving yourself open for an excuse for your staff not getting together with your vendor to work out details before hand. The most productive meetings are those where some of the parties have already met and made some progress or come to the table with specific questions and or issues and possible solutions.

You may feel that the above recommendations will result in your attending many more meetings than you would have otherwise. This may be true. However, the success of the installation is not based on how many or how few meetings you have attended or organized, but rather, what has been accomplished and correctly communicated. Having the ability to focus on particular subjects will allow you to better determine the particular needs while having the appropriate staff at the right meetings. Fewer but

larger meetings are really more of a waste of time of more staff than the above outlined method. Even with this method of arranging meetings, plan on spending more time in meetings than you have time for.

WHO TAKES THE MINUTES:

As with the weekly meetings noted above, the subject of meeting minutes may also find its way into the final telecommunications contract. The fact that weekly meetings and the taking of the minutes of these meetings make their way into the contract is of significant importance and goes to reinforce the importance of these two events to the Project.

Historically, minutes are recorded and provided by the vendor. Most customers are more than willing to take this approach since it is generally recognized that the taking and distribution of minutes is very time consuming and in general a pain. However, if you take this approach you must then be willing to carry the other responsibility that goes along with it. The minutes of each meeting must be checked and verified against your own notes from the meeting. Not just occasionally, but each and every time.

One simple rule should encourage you to check the minutes of each meeting; minutes will be wrong week after week if you do not keep them. This is not to say that the vendor is trying to pull something over your eyes because they are controlling the recording of the minutes and their distribution. It does mean that not all items that are of importance to you but not necessarily to your vendor will be remembered as you noted them and then find their way to the minutes. Further, the recorded minutes should represent what was intended by both parties. Your providing a qualified YES to an issue that then gets recorded without the qualification may pose a serious problem later when and if the issue is raised again. The minutes should not work for or against anyone, but rather serve as the bases of the meeting of the minds.

It is not always easy to record the minutes of a meeting accurately. Often times items are left ambiguous by either party because there is no clear answer or under-standing. As often as possible, both parties should agree that certain items will be recorded or be left stated a certain way. If the item is clear to one party but not the other, you have created yet another problem.

How do you check your minutes week to week? If events are going as planned, you will receive a copy of the minutes from the previous meeting several days prior to the start of the next meeting. It's at this time you should check your notes on the previous meeting and compare them to what has been recorded. If all is recorded correctly you will have wasted just a few minutes, if not, you will have invested a few minutes very wisely. Depending on your relationship with your vendor and the time till the next meeting, you will either let them know of the discrepancies prior to the meeting so that a new set of minutes can be created and distributed or wait till the meeting to raise the issues. Sometimes waiting for the next meeting is best. This allows for discussion in case there was actual misinterpretation by either party.

One way I was able to defuse a number of issues was by bringing all my past minutes with me to every meeting. To accomplish this I had all my minutes 3-hole punched and placed in a three ring binder in order of date. This was a very convenient way to handle and file them and made transporting them relatively simple. I had a separate binder for each set of minutes.

The minutes of the various meetings are an important part of the entire installation process. They can often become the deciding factor on issues of great importance for both sides of the installation. Your job is to make sure that the minutes, week after week reflect your institutions position on the issues brought to the table, accurately and clearly.

MINUTES FORMAT:

The format used to record the minutes is not nearly as important as the content. However, if you are engaged in several sets of meetings, each with its own minutes, it makes sense to have all the minutes conform to the same format. Here are some details that should appear with each set of minutes:

The Header should clearly indicate the name or title of the meeting for which the minutes are for.

The date, day and time of the week the meeting was held.

Where the meeting was held.

I like the idea of keeping a consecutive count of meetings. That is the first meeting is Meeting No. 1, the second is Meeting No. 2 and so on. This is in addition to the date of the meeting noted above.

The name of the individual who took the minutes of the particular meeting will sometimes prove important. This will sometimes also help explain certain errors or omissions from the minutes.

A list of the Regularly Attending members of the group by Vendor and Customer.

A list of any Special Attendees that may have been invited for a particular purpose.

Each item noted on the minutes should be numbered such that it can be uniquely identified and referred to in future minutes. For example, the first item from the minutes of the meeting held on Oct. 13, may be noted as 10/13/01, the second item of the minutes as 10/13/02, the third as 10/13/03 and so on. In this manner future minutes could refer back to a particular reference in past meeting notes very easily and clearly.

Often it is the case that the minutes are distributed to a much wider audience than that which attends the meeting. You will find it very helpful for your vendor to note who else they are distributing the minutes to in a Carbon Copy section of the minutes. The same should hold true for those in your organization that copies are supplied to.

Another important section of the minutes of any meeting is the Action Item listing. This is a separate list of items that the parties have agreed to follow up upon. The Action Item list should note:

1. The date when the item first appeared on the list.
2. A short description of what the Action Item is.
3. Who is responsible for the Action Item. Not just noting it as Vendor or Customer, but who on the appropriate staff has taken ownership of the Action Item.
4. When the Action Item is expected to be answered or completed.

This list should be reviewed and updated at each and every meeting. When an Action Item is due and not yet completed by the agreed upon completion date, an explanation is always deserved. If missed, the first completion date should remain on the Action Item list when another one, that is again agreed to, is added. If several completion dates come and go, it will be obvious to all that read the minutes or attend the meetings.

All of the above may sound like a lot of work. However, a good word processing program makes short work of the worst minutes. After the major items have been entered in the first time, it is usually just a matter of updating the minutes week to week. The worst part of minutes, if done properly, should be the copying, collating and distribution.

If minutes are done correctly, both the vendor and customer will benefit greatly by having a working and written history of the Project. Poorly maintained minutes could be indicative of the installation.

MEETINGS:

Good minutes generally are the result of good meetings. Poorly organized and attended meetings can only result in minutes that reflect that action. Again, there are many good books on the "how to" of running a good meeting. Listed below are just a few of my favorite meeting rules that seem to work and keep the flow of the meeting going:

- Start the meeting on time. Sounds simple, but is much harder to do in practice. The only way not to waste your time though is to stick to the agreed starting time. If parties are habitually late, schedule the meeting to start at 15 minutes after or before the hour instead of on the hour.

- End the meeting at a scheduled time. To allow you and others to plan on other meetings and work assignments, you must schedule how long you expect meetings to last. This also tends to cut down on social talk and get down to business right away.

- If you have a written agenda to cover, start with it and stick to it until all items that must be covered have been. If there is no written agenda, start out with what specifically you expect to cover at the meeting and what you expect to leave the meeting with. For example, an agreement on a cable pathway or a process to follow for access problems.

I will not bore you with such standard items as not starting your meetings right after lunch time or too late in the afternoon when staff may be watching the clock for the next or last train or bus home. I will remind you that meetings are the primary way by which meaningful information is shared in projects like this, the better the meetings are managed and controlled to accomplish what you set out to do, the easier the whole Project gets.

Meetings can quickly become tedious and meaningless if progress is not consistently made week after week. You can quickly loose your momentum. You can not afford to allow either your staff or that of your vendor to come to meetings week after week with the same excuses for not making progress. If delaying patterns start to develop, identify them up front and discuss them frankly with your vendor's Project Manager for fast resolution.

If your vendor keeps coming back week after week with excuses for not getting what seems to be simple things accomplished, that is very likely a symptom of other problems that you will need to dig out and identify. Your vendor can experience personnel conflicts and staff shortages just as easily as you can. Once the problems are identified, help your vendor get them solved quickly. If the problems require personnel changes, better to get them over with quickly than to allow them to fester and interfere with the Project.

One final note on meetings. I strongly urge you to find a single location where most, if not all the Project meetings can be held. This will allow for the posting of maps and plans and other paraphernalia that will aid in the overall management of the Project. The ability to have these items permanently posted on the walls where you meet instead of constantly moving and reposting them will greatly facilitate your meetings. A Project Center may also help add to the prestige and identity of the Project.

VENDOR PROVIDED MANAGEMENT REPORTS:

How do you trust that your vendor's reports are correct, accurate and respond to your need for information? You don't!

There are many, sometimes hundreds of items that need to be tracked during the course of an installation. Next to meetings, the only way you and your vendor can control the course of the installation is by the production of accurate, meaningful and regular reports.

To this end, you may have to explain to your vendor that you are not going to close your eyes for the next 12 to 20 months and open them again when they have completed their work. Your vendor must understand that you have a responsibility to your management to manage the vendor and the Project along with them. This joint Project Management scenario requires that your vendor share their management information with you in the form and manner that you need it.

It is very likely however that your vendor's project team has a very different idea of the necessary management information and reports for the running of the Project than you do from the users perspective. This is not unusual. Different sets of users have different needs for information.

You need to make sure as early as possible that your vendor can provide the type of information you need and in the format and time frames that you require. If possible, you should design the format in which the information needs to be provided to meet your needs and insist that your vendor build their data bases and reports to your requirements. This is no easy task. You may not really know what you need until you need it. Often it is the installation process that leads to the specific needs of your organization for information and reports. Here are a few examples of what we needed for the general management of the installation:

○ A simple report for the vendor to keep track of was how many jacks in a building they had installed. This was not nearly enough information for us. We needed the following categories of information by building:

- contracted number of jacks per the RFP, per building;

- contracted growth jacks per building based upon percentage growth criteria, in our case 30% growth was allotted;

- how many jacks were actually installed as part of the base and as part of the growth;

- if 30% more then the base was installed, how many more (we were billing back to the users the cost of additional growth jacks above 30%);

- how many jacks were for wall-mounted phones versus desk, these were priced differently.

This report was made even more complicated by the fact that we also needed the same information by Telecommunications Coordinator. In some cases, the Coordinator had space in a number of buildings and more commonly, there were a number of Coordinators in each building. All the vendor really needed was a total jack count for their purposes. As you can see, we needed much more.

◉ Not just any Project schedule is a Project schedule. The larger the campus and/or buildings and the scope of work involved, the more difficult it is to keep an up to date project schedule for the entire Project. The Project schedules for your installation need to be detailed and tailored to your installation. Your vendor may supply one large PERT chart that they consider to be the master or overall schedule which they generated at the beginning of the Project. This chart will be accurate for only as long as it takes to pin it to the wall. What is needed is much more in the way of planning by you and your vendor.

● A good, carefully thought out overall project schedule is an excellent general working tool. It helps to keep the focus on the end date for all the work to culminate in a smooth cut over. It allows for eyeballing of the interrelationship of all the individual jobs that must be accomplished in what order.

A good, generalized overall Project schedule program will allow you to move and change dates as is necessary and have the entire schedule adjusted accordingly. Further, adding project parts or items to the general schedule must be easily done for those unexpected asbestos abatement jobs or new construction jobs that have been approved since the work started. The project schedule must be reproducible as the installation factors change.

- A good general Project schedule is not enough. To really keep track of the progress of the Project many more details are necessary. With today's availability of computers and good software there is no good reason why you can not have your vendor generate detailed charts, graphs and reports on a regular basis. For example, a separate set of charts and reports for outside plant versus inside plant will allow you to keep track of both much easier then if they are combined into one. If you are installing 10,000 jacks in a specific period of time, graphing how many need to be done on a time line versus how many have been done will very clearly show you if you are on schedule. If you are doing more than one building, a separate chart for each building with the associated activities needed to bring the building on line can very well help keep the Project on track and identify potential problems early on.

Providing the kinds of information and reports you need for the overall management of the Project can be an enormous undertaking by your vendor. This is especially true if you have not made your information needs clear to your vendor and have their full cooperation. This gets even more complicated if your vendor does not understand that your needs are different than their's. It may take some time and explanation to your vendor, as noted above, as to why your needs must be satisfied to have a successful installation. It does you little good for your vendor to have a successful technical installation that fails to satisfy your managerial needs. What can you do to make sure your vendor will not only provide the reports and information you need, but can also generate the information they will need to run and manage the Project?

- Make sure your vendor's project team has the right tools. Sounds simple. You can not depend on your vendor knowing what tools are needed and that they have actually planned for these resources to be available to them. Again, if these items have not been spelled out in the contract, you need to have very detailed discussions very early on in the process to see if your vendor's project manager is aware of what is really needed. Some of today's Project Scheduling software requires large amounts of memory in certain types of personal computers. Some software may just be to limited for use on your Project or to complicated for anyone to master. Here's what you do:

- First, find out how your Project team plans on keeping up to date schedules and charts and reports for the Project. Ask for copies of the reports from previous jobs that they have done. Doing this accomplishes several things; 1) you find out if the software actually exists, 2) you find out if any member of the Project team has actually used the software to manage an installation and 3) you get to see a preview of some of the reports you can expect.

- Second, if you are satisfied that the software actually exists, you need to make sure that the appropriate hardware will be available on site for the Project team to work on the data bases. If the work is done remotely, you have problems in time delays and accuracy of the data being entered. You should insist on local control of all data entry and data manipulation.

- Third, if you are satisfied that the first two items are synchronous, the most important issue is **is there someone on the Project team that knows how to use the software for management report generation purposes?** Most good Project Management software today can do and create many reports and charts for the purposes of keeping track of a large installation. However, to really get your money's worth, someone on your vendor's staff needs to be able to do more than data entry into the system

and generate just a few standard report. Find out who is really familiar with the software and if they can really have it generate all the needed information. If this person does not exist, you and your vendor have a problem.

- Fourth, it is unlikely that all your management information will be contained in the one Project Management Scheduling software. Often times other forms or items of data require your vendor to maintain other data bases as well. Such popular programs as **dBase** or **Paradox** for large complicated data bases may be needed or spreadsheet type programs for maintaining project costs or budgets. If your vendor is going to utilize these programs, they should have more than just a general working knowledge of the software. Often, the only way to generate the information you will need is by actual programming so that the correct sorts and sequences of data are available for you.

- Fifth, whatever hardware and software your vendor selects for the recording and generation of management reports for your Project, the best protection you can have for yourself is to be able to duplicate the hardware and software. In this way, if your vendor can not satisfy your management and information report requirements, you will at least have the capability to do it yourself. This assumes of course that the vendor at the very minimum can maintain the data in at least some meaningful format. No one wants to do the vendor's job for them, but if push comes to shove, you have to be prepared with a backup. I strongly urge this position until such time that telecommunications vendors become far more expert at this aspect of the installation process.

Not only should your vendor have the necessary computers, but they should have the necessary printers, plotters and any other output device that will provide the necessary actual reports. Although it may be too much to ask, they should also know how to use the computers and the operating system it runs on. Also, make sure they have their own copier in their office.

If your Project is large enough, one computer system will not be sufficient. Do not allow your vendor to fall into a false sense of security that if they have a single personal computer that it will do all the work that is needed. For our 10,000 line, 13,000 jack installation, more then one computer system was necessary just to allow all of the data entry to take place on a timely bases. If your vendor is going to be in more than one place they will likely need at least one system for each location.

Word processing needs should not be forgotten either. You do not want to hear the excuse that reports were late or letters or new quotes could not be produced because the computer was being used for some other purpose. Depending on how your vendor plans on loading your switch detail data and your telecommunications management system, many more personal computers could be required. We required almost a dozen.

Unfortunately, after all your efforts to get your vendor to generate all kinds of reports and charts and graphs as outlined above, your vendor's data will be wrong. This will likely not be malicious or done on purpose or to even hide a bad problem, but the reports will be wrong anyway. Depending on who is preparing the reports, every report every time may not be wrong. You will require a method of verifying your vendor's data and information.

Your job is to double check the data for accuracy. Cross foot the information with different reports that have the same data but in a different format. Check the data from report to report and notice differences that should not have changed or have changed to greatly or to little for the period of time from the last report. Know when your vendor last updated the report and what period of time they have actually included. Dating

each report will help avoid confusion as to which one is the latest version. I call this process giving the data a "smell test." Does it smell right for the purpose intended. Often it does not meet this test.

Your vendor may very well go through several MIS or personal computer systems and staff before coming up with one that works and is reliable. Be somewhat patient. If they ever get one that really works it will save you tens, or even hundreds, of hours of work and allow for a far better managed installation overall. But do not be too patient. Too little too late helps no one.

DOING IT RIGHT THE FIRST TIME:

There are many small nuances that add up to doing the job right the first time. Each one of the items noted below individually may not be a large source of good cheer, but when you add them all together, they certainly make the review, use and productivity of meetings and reports much easier and more pleasant during the course of the Project.

- One of the most annoying events to happen is to make or produce a lengthy computer report, print it out and give out your only copy before you have a chance to make an additional copy. One easy solution to this problem is when printing out lengthy computer reports, do it on multiple part type carbonless computer paper so that you have built-in copies. This type of paper may be a bit more expensive, but you will save yourself many hours of printing reports over and over when someone else needs a copy. Often times that someone else is you. Make sure your vendor uses the same approach, they will never make enough copies either. Keeping the second part also helps out later when trying to trace progress of reports from one to the other. Your data bases will be continuously changing, when you need another copy for someone, you really want it to contain the same information as the one you distributed to others. Printing another copy often means printing out the changes that have occurred since the last printing.

- There is nothing worse or more frustrating than trying to read a dot matrix printout that was produced with a poor or worn out ribbon. Especially when you are reading rows and rows of numbers and figures on a regular basis. Make sure you have a generous supply of the correct printer ribbons along with your vendor. Having the ribbons in stock is only the first step, change them often, or at least as often as necessary.

- Assuming that you have already assured yourself that your vendor will have available to them good, crisp, clean printouts, you want to make sure what they deliver to you is also of the same quality. Often this will be in the way of a xeroxed copy. If your vendor can not provide a simple thing like a good, clean xerox copy of the documents you require, always insist on the originals. If they are smart, they will get the idea. It is amazing what someone will give to you to work from when they would never think of using the same document for themselves.

- Now that you have assured yourself of the quality of the reports that will be generated by your vendor, you need to get the right number of copies for distribution. To this end you should inform your vendor of exactly how many copies of documents you require for your distribution list, both official and unofficial. Having your vendor supply you with the copies will facilitate your getting them out to the proper parties with little or no lost time. Your vendor may object to adding dozens of copies to what they are already making, however, that is just the point, they are already making them for the Project. I would not place the responsibility on the vendor to distribute your copies of important documents to other critical persons on your campus/company. You should be responsible for this action.

- You will very likely want to receive copies of all documents generated by your vendor that are addressed to anyone else in your organization. To facilitate this, you will have to constantly remind your vendor to copy you on all communications to your organization, regardless of who they are sending it to. They will not remember, they will forget, you will have to constantly remind them. This problem is especially important if there are changing faces on the vendor's Project team and you are sharing/coordinating the installation with other company personnel. As soon as documents are in the hands of others in your organization without your knowledge, you have lost control.

- One way you can help to facilitate the distribution of project related mail and documents is to set up two central mail boxes or distribution centers. One mail box/distribution center for your organization and one for your vendor's mail and correspondence. This plan is especially helpful for installations where the Project teams are in several different sites on the campus. This now places the onus on the Project staffs to check regularly for their mail at one location; with no excuses that the letter is in the local mail or was left with your secretary. There will always be those items that are hand delivered or brought to meetings, but routine mail delivery could easily be handled this way.

I have one story to demonstrate how mail delivery can go awry.

Our vendor had hired a temporary person to handle mail and telephone calls during one part of the Project. During this person's stay with the vendor, he was asked to make sure that a certain set of letters reached myself and my staff. Mind you, that our Project offices were less then two blocks from each other on the same campus. During one vendor meeting my secretary came into the room with several separately mailed Federal Express envelopes that had just arrived. One envelope for each of my staff. It turns out that the vendor's temporary secretary took the instructions to heart, not knowing the Columbia campus or having knowledge of the Project, he took the letters and had them all, separately, Fedexed the two blocks from the vendors office to ours. We believe that no other more expensive set of letters had ever been mailed from one point on our campus to another.

- ○ Meeting space. The Project will generate an avalanche of documents, charts, blue prints, drawings and diagrams. Much of this information is needed by a variety of personnel working on various aspects of the Project. If at all possible, a permanently assigned meeting/conference room large enough to accommodate the largest of the meetings will be a godsend to the Project. This will allow for the accumulation of critical maps and charts to be posted and placed in an area that is accessible to all the members of the Project without the need to constantly move and bring them to different meeting places several times a week. This place also provides a common meeting ground for the parties and can generate a good feeling of camaraderie if managed correctly.

- You may think it is a good idea for you to insist that your staff provide you a weekly report of their activities, accomplishments, problems and statuses of ongoing events. This is a good idea that may have a significant trade off. My staff never worked a 35 hour week. With the construction/installation crews working one set of hours and that of the campus working another, the work day always stretched out beyond the norm. For a time at the beginning of the Project, I had insisted that my staff prepare a weekly report. Unfortunately I found myself spending as much time chasing them for the reports than reading them. After a time, I settled for regular meetings with my staff in lieu of the written reports. With some hindsight, I would have kept up with the written reports. They become important documents in the overall management of the Project. Your staff's documenting the issues and concerns added to the minutes of meetings are a powerful combination for those times you and your vendor do not agree to the facts, dates or what was said to who and when.

As with the minutes, there are more difficult and then easier ways for your staff to communicate their weekly status to you. An electronic mail system makes this process significantly easier then it would be otherwise. Once the first set of facts are written

into a weekly file, the effort to update the report once a week is not an item that should take a dangerously long period of your staffs time. The ability to then send the report to you electronically is an added plus for you and your staff.

Keeping In Sync;

Besides the formal need to communicate about the Project and where you and your vendor are headed, there is another just as important aspect of the meetings and reports that must be kept in mind. You and the vendor have to be working from the same set of information and assumptions. If not, the differences will come back to haunt the both of you.

This is where the regularly and well documented meetings and reports of your vendor and staff are very important. The University had established a simple policy, "we would not support local exchanges on our new system other then the ones we were contracting for centrally from our telco for the University." The reason for this policy was because there were a number of departments, for historical reasons, had contracted independently with our local telco over the years and had exchanges installed that were different then that of the rest of the University. We felt that since the entire University was going to have to change to a new exchange, that these individuals and/or departments should also change theirs to the new exchange. There was also a cost consideration in the need for added trunks on our switch to handle any added exchanges.

However, since a few departments were paying for these lines themselves and did not want to give them up, we also came up with a policy that if a user wanted to keep an existing old exchange, they would also have to keep their old telephone equipment. We would not move the old exchange to the new system. This would mean for those that wanted to keep the separate lines, they would also have to keep two instruments on their desks. We had anticipated that this would be sufficient encouragement for 'hem to forgo the second exchange and join the system.

Although this policy was decided and our vendor's management knew of the decision, our vendor's designers did not get this information passed along to them. Hence, the designers who were our principle contact with the user community went out and told our users that they could keep their old exchanges but neglected to inform them that they would have to also keep their old equipment. We only discovered this minor omission at cutover when the calls started to come in wanting to know when their old numbers would be moved to the new phones.

I wish I can say that this was the only minor detail that did not get communicated correctly to all the staff of both the University and our vendor. You may find it very difficult to maintain a balance of communications as the situation changes on a daily basis. What you want to do is minimize this aspect of your installation by following the recommendations pertinent to your organization and installation made in this chapter.

VENDOR'S SPACE:

Chapter   4.

SPACE

The writers of the introduction to Star Trek had it right: "Space, the final frontier." But in this case the space we are talking about is much closer to home. Of the many items I now look back on, one of the most critical and time consuming issues involved the use and availability of space around the campus. Almost any large urban campus or business has too little space to accomplish its goals. This is even more true when talking about real estate in the City of New York where the Columbia campus is located. Whatever you do, do not underestimate the amount of space you will need to do the actual installation and all the associated work. I will attempt in this chapter to sensitize you to the many unforeseen but very necessary needs for space and those events and issues that take more time than you at first think.

To place the subject in focus, keep in mind that Columbia University is located in Northern Manhattan. There is very little land left on the campus that is untouched by buildings or not developed and, that we are in one of the most expensive real estate markets in the country (see accompanying campus map). Even with the hundreds of thousands of square feet the University occupy's, the University still finds it necessary to rent space from the surrounding community to hold classes in and to house many administrative offices. From discussions with my colleagues around the country, even with large open campuses, this is not an unusual situation. Any business, large or small, will have the same set of issues in regards to space. There is just never enough good space to do everything that has to be done.

VENDOR'S SPACE:

Lets start with the obvious. Your vendor will be placing additional staff permanently (permanent being the length of the project) on your premises. This is more than desirable from your point of view, it is critical.

Consider, your vendor will be placing their management and support teams to work full time on your campus for anywhere from 12 to 24 months. These folks will be working on your campus and performing functions that are critical to your success and that of the Project. Most free (and I use the term loosely) or available space is usually not very desirable or fit for human habitation. If it was, it would have already been occupied. Sure you have a basement that can be converted with some paint or furniture or a dungeon somewhere that is available. But is this the type of space you would like to be cooped up in?

COLUMBIA UNIVERSITY
The Morningside Campus & Environs

International House

West 123rd Street

Manhattan School of Music

Jewish Theological Seminary

West 122nd Street

Union Theological Seminary

Hastings

Grant Sarasota

Corpus Christi Church

Bancroft The Fairholm

West 121st Street

Riverside Church

Thorndike Macy Grace Dodge

Horace Mann

Teachers College

Thompson Main Russell

Whittier

Plimpton (Barnard) Seth Low

Minor Latham Playhouse

West 120th Street

Interchurch Center

West 119th Street

Flske Milbank

Brinckerhoff

Helen Millicent Goodhart McIntosh Altschul Center

Pupin

Pegram

Engineering Terrace -- below

S W Mudd

Marcellus Hartley Dodge Physical Fitness Center

lower level University Hall & Gymnasium

Computer Science

Sherman Fairchild Center

West 119th Street

Butler Hall

Morningside Drive

Chandler

stairs to Gym

Ext. to Gym

Schermerhorn Ext

Riverside Drive

Claremont Avenue

Lehman

Barnard College

Broadway

Havemeyer

Computer Center

Service Building (lower level)

Uris

Schermerhorn

423

West 118th Street

Amsterdam Avenue

Barnard

Mathematics

Avery

Avery Ext.

Fayerweather

International Affairs

Heyman Center

Casa Italiana

East Campus

Hewitt

Helen Reid

McMillin Theatre

Earl

Low Memorial Library

St Paul's Chapel

Philosophy

Buell

Maison Française

Law

Johnson

Jerome L. Greene

Faculty House

Lewisohn

Alma Mater

Brooks

Dodge

Kent

President's House

IRT

Info. & Visitor Services

College Walk

West 116th Street

West 116th Street

620 616 Casa 600 Hispanica

Journalism

Hamilton

Annex

King's Crown Deutsches Haus

1127 Amsterdam Avenue

Woodbridge 635 617 Schapiro

Site of

Furnald

Hartley

1121-25 Post Office

West 115th Street

West 115th Street

St. Hilda's and St. Hugh's School

612 Watson

Parking Lot

Broadway Presbyterian Church

Wollman Auditorium

Ferris Booth

Butler Library

Wallach

Columbia Health Service

Woman's Hospital

Notre Dame Church Eli White

Accessible

Carman

Harkness Theatre

John Jay

West 114th Street

River

618B 616 614 612 610 608 606 604

Hogan

540

Ruggles

St Luke's Hospital

George Barry Ford

Robert Watt

West 113th Street

McVickar

McBain

Armstrong

West 112th Street

3/86

It is to your advantage to have sufficient and pleasant space for your vendors. They will likely spend evenings, weekends and some holidays there, but only if you have a pleasant enough place for them to go to. Don't scrimp. Even if your vendor says that they will only have "X" staff there at any given time, they will likely have more during the crunch or when they find that the Project is bigger then they expected. Success of the Project lies with you. You do not want to offer your vendor any excuse for not having the correct resources at your site.

Try and provide space for your vendor so that they can have their own full blown office operations; copier machine, FAX, secretary/receptionist and room for their computers that they will use to run the Project with. Remember, these things take space and power. They should be afforded air conditioning in the summer and heat in the winter. Make sure that your vendor has a place to meet privately with their own staff. You do not want them always asking to use your conference room forcing you to reschedule your own meetings.

Do not count on placing your vendor's personnel in the switch room when it is completed. The switch room is not going be ready in time and when it is ready there will not be enough room there for both the staff dedicated to getting the switch installed, the cables connected and the staff managing the rest of the installation and design. Not unless your switch room has 100% spare capacity for growth and you have space to burn.

At Columbia, I first asked the University Space Committee for space to house about 12 to 15 of the vendor's personnel. They sent me to the University Real Estate department. This immediately translated to paying for rented space and more costs to the Project. So it seemed that if I was going to get space I was going to have to pay for it. We first looked at a defunct Chinese Restaurant about 5 blocks from the closes building on the campus where the system was being installed. We decided that the space was too far from where the action was going to be and would hinder communications, not to mention meetings when it got cold, wet or snowed. The second place we looked at was a Japanese Restaurant that was still in business but did not need all the space they were occupying. This also did not seem ideal. The chef was doing his knife act when we walked through.

I finally decided to remodel some first floor storage space in one of the dorms on Morningside Park Drive. The original plans for this space was for it to become storefronts with real commercial tenants after the dorms were built. For many reasons, that particular plan never materialized. However, the occupied space eventually became known as the "Storefronts". This space was so remote and forgotten it took us several months to even get a street address for it.

A minor renovation project converted the Storefronts that were being used for storage space into usable people space. The space only needed: power, outlets, lights, walls, a paint job, a complete overhaul of the HVAC system, security gates over the very large windows, telephones, keys for the doors and an address. The completed space, at no small cost mind you, actually looked fairly decent when we were finished. The kicker to all this is that the Telecommunications Office was not able to keep the space at the end of the Project. It reverted back to the University, including all the improvements we had made to it.

We were absolutely sure that we now had as much space for our vendor that we would ever need. Six months later we had to convert the rest of the Storefront space, about another 600 to 800 square feet of space for additional, unplanned for, and unexpected vendor staff.

As good as we thought the Storefront space was, it had its problems. The space had several undocumented features which we only learned about after our vendor moved in.

- The first major rain storm we had resulted in a torrent of water finding its way into the entire Storefront space. It seemed that the space was about 1.5 inches lower then the sidewalk outside and that the sidewalk was tilted towards the doors. About two inches of water found its way onto the floor of the space. Luckily no equipment or drawings of value were on the floor. This did away with any idea of getting carpets installed in the space.

- The HVAC system for the space was part of the University's centrally run system for that part of the campus. During the summer of 1988 the HVAC system failed for several weeks. Not that the Storefronts were the only buildings affected, but the new nickname for the space was the "sauna". Although our vendor complained and rightfully so, they really were very good about the entire problem of heat.

- I also have to give some credit to the vendor's mini switch they had at the Storefront. Even with all the heat and water we had that summer, the temporary switch they placed there for themselves never failed.

One of the worst problems we had with the provided space has no humor in it at all, or at least very little. The entry way into the Storefront space was directly underneath and in line with the windows of a very large dorm. For whatever reasons, there were students that insisted on throwing everything out the windows from condoms to bottles of wine and liquor. This represented a real danger to the vendor's staff who needed to come and go from the office space. We never were able to identify any of the rooms or students from which the trash was being thrown. However, because of another University project, scaffolding was eventually built around the door and entrances of the space providing protection from falling items.

Now that you have taken care of your vendor's staff, what about that of the many contractors that will work for them?

VENDOR'S CONTRACTORS SPACE:

We had at times over 100 contract workers on the campus doing various installation work. Just as important as housing the vendor's management and project team is finding and housing the subcontractors who will be doing much of the actual installation work.

The contractors doing the actual installation need a place to meet and organize the crews and to house the contractors managers and supervisors. After a similar search as noted previously for the vendor's staff we came up with what I think was a unique solution for housing a much more transient worker force.

The University had recently demolished a building on one of the side streets in the neighborhood. What was left was the basement structure of the building filled with lots of rubble and dirt. The idea was to fill and pack the remaining basement structure

with pebbles, put up a fence to secure the area and allow the contractors to place trailers on the space. The idea was a good one at the time, until we got some engineers involved (more about engineers later).

We lost about a third of the space to a perimeter safety precaution insisted upon by the University engineers. They did not want the remaining basement structure to collapse under the strain of the trailers and cars that were planned for the space. So the fence was placed about 15 feet in from the perimeter. This we discovered only after we spent the time and money to fill and level the space with pebbles.

Speaking of pebbles. We almost lost our vendor Project manager when testing the new space for its suitability for use. Before placing cars and trailers on the newly created space we suggested that a car be driven around the lot to check for soft spots. The first car that went in, driven by the vendor's Project Manager, eventually sunk up to its wheel wells. To say the least, our vendor was not very happy about placing trailers, cars and cable reels on the lot. However, after some settlement of the pebbles and the rubble underneath, the space finally settled down and was used for trailers, some cable reels and a few cars with no ill after affects, and our subcontractors were taken care of.

STORAGE SPACE:

How efficient and productive do you want your installation teams to be? How much storage space, its general accessibility and where it is located has a lot do with this issue. To little space requires many more deliveries of materials. The added time spent on the deliveries is just part of the problem. You can count on the materials you need Wednesday not being in stock until the following Tuesday.

Where you store the material on the campus is just as important as to how much space you allow for the storage. Do you have a number of smaller areas distributed around the campus that add up to the total amount of space you need? Is some of it outside exposed to the elements, inside, ground level, in basements? Is the material secured? I mean secured! Locked up and not accessible to anyone but the staff who require access.

Another important factor is whose space it is you are using and are they going to be cooperative for an extended period of time. You do not want to just borrow this space for a week or two. Will the people that control the space give you and or your vendor keys to the space or will they insist that each time access is needed that they provide the access. If you are borrowing someone's space and they do not understand that you will be coming through several times a day with large deliveries or moving equipment in and out regularly, they may be very unhappy and make life miserable for you and your vendor.

You have to take all of the above into consideration. You and your vendor have to agree who has access to the material and who is responsible for keeping track of the inventory. If you are installing a totally new cable plant, you must understand the large amounts of material required for this endeavor and the storage requirements. Here are a few things to keep in mind.

- Outside plant cable reels can be eight feet tall and more then four feet wide, wider then most doors, and weigh thousands of pounds. If you can imagine these cable reels and how the reels are built, you will quickly realize that the entire weight of these reels need to be supported on just a few square inches of space because of the way the reels are designed. This design places a great deal of load in very little area. You have to make sure that your access path for these reels is wide enough to

accommodate them and can support the weight. One other thing, when your vendor stores them, make sure that they secure them in such a way so that they can not be rolled or moved by some curious students or employees. A run away rolling reel can kill someone or cause great damage.

- Cable trays come in all lengths and sizes. They are difficult to move in close quarters and generally do not stack very neatly. They also need a lot of room to turn corners. They certainly do not come in neat boxes to be stored and stacked up to the ceiling.

- If you are installing a cable plant that will be concealed, that is, all station cable is in some type of wire molding, you will require to store boxes that are long and narrow. Raceway and wire mold boxes, thousands of feet of them, will need to be stored and accessed regularly. You will also very likely have various sizes of this material to be stored, inventoried and accessed. Wire molding also requires more small parts then you can imagine. You have corners, 2-way, 3-way, 4-way splitters, of all different sizes, right angle, pieces to connect to the jack, some for wall mounted phones and some for desk phones. These are generally small boxes and can easily "grow legs" if not properly secured.

- Pallets. Many of the installation materials are only delivered on pallets. If they are, you need the right loading and unloading facilities to handel these. Will your vendor be totally responsible for this? I hope so.

Our vendor underestimated the need for storage space for our project. This error was compounded by the fact that space at Columbia was one of the hardest commodities to come by. Even for storage, especially when you take into consideration the special

needs noted above. The Project Team spent an inordinate amount of time looking for and securing storage space for the installation. Here is an interesting story to demonstrate that any space you want to use will not be good for someone. There were some outside renovations in process on a particular part of the campus. Much of the outdoor space for the renovation was already blocked off by large barriers. The work was being done adjacent to our Faculty House. We worked out an arrangement with our Facilities department, since the outdoor space was already blocked off, to store some of our cable reels in the space. This seemed like a good idea at the time.

Well, on one Friday afternoon I left work somewhat early and arrived at home at about 4:30. On my answering machine were no fewer then seven messages. A vice president called twice, the manager of the Faculty House called twice, our vendor called, Facilities Management called and my secretary called. Mind you, I lived only 20 minutes from the University.

What was the panic about? The Faculty House was catering a wedding party to an alumnus that Saturday. The Manager of the Faculty House did not want the wedding party to see "all those ugly cable reels" sitting in the blocked off space that was opposite the Faculty House. You can not imagine the ruckus this caused. No one was accepting any excuses and there really was not anything I could do with the short notice. These were full seven and eight thousand pound reels of cable and could not be easily moved or hidden. Finally, to solve the problem we put up some paper covers on the surrounding fence so that the wedding party could not see into the space where the reels were being stored. The couple is happily married.

My advise, take the time before to identify storage space and handle the details prior to it being needed. You will save significant grief later, but not all of it.

THE PHONE FACTORY:

What is a "Phone Factory"? That was my first question to our vendor when they said they needed at least 2,000 square feet for a phone factory. The phone factory was a term our vendor used to describe the space needed to have the 10,000 phones shipped to and set up for installation. This was a nightmare. I guess the Project Team should have been thinking about it, but we were not. It was not until just several weeks before we were to start station installation that the need for the phone factory was raised.

The need for the phone factory is a perfectly reasonable expectation. If you are to install several thousands of stations in an orderly and planned manner, you really do need to plan on how you are going to get them delivered to your organization. Consider what events need to take place at the phone factory:

- First and foremost, thousands (or maybe hundreds in your case) of stations will need to be delivered either all at once or at least in large quantities. They are usually delivered on palettes. Don't be fooled by the small size of a station sitting on a desk. The boxes take a great deal more space.

- The originally delivered boxes with the phones in them will need to be stored, probably by phone type and building where they are going to be installed.

- Your vendor will likely take each station out of the box, check the station for physical defects, and place the appropriate face plate on the station. The stations will generally be placed back in the box, the box labeled as to where it is to be installed and stored by building and floor.

- The stations then need to be removed from the phone factory as they are needed to be installed in the specific locations.

Sounds simple. When planned correctly and given the amount of space needed, it can actually work very well. The key, appropriate space and the space being in the right place. We were lucky. The University had just acquired some warehouse space that we had not renovated or moved into yet. I borrowed about 2,000 square feet of open and secured space in the warehouse. We had large freight elevators to allow for easy movement during shipping and enough space for the staff to work in.

Our vendor had several thousand phones of various models delivered at a time. This enabled us to configure entire buildings at a time with all the various types of stations needed. Since the warehouse was several blocks away from the main campus, we moved the stations down in smaller trucks sorted by building and managed the daily installation from the trucks. It would have been next to impossible having to do the station installation any other way. The fact that the boxes had already been opened, the face plates installed and the boxes labeled was the only way to install 10,000 stations in less then three months. Less space would have required more staff and likely several shifts.

None of the storage space on campus we had would have been sufficient to have doubled as a phone factory. Further, the available Project storage space was still full of installation material when the phone factory was needed.

My recommendation; if sufficient space for the phone factory is not available on your premises or in other large spacious areas under your company's control, rent it. Don't try to skimp and save by using space that is clearly too small for this very large task. It will only get you into trouble and could cause you to miss your cutover date.

If you are reading this book, you are already far more along in your planning and knowledge of the space needs then I think you would have been otherwise. The space needed for the delivery of the stations and the need to get them prepared for installation is absolutely required. The difference between the phone factory space and the other space needed is simple, it needs to be much larger for a shorter period of time.

Identify it now!

TRAINING SPACE:

Where do you find space to train thousands of personnel? - No Where!

Finding space for educating and training personnel on how to use the new Telecommunications System may seem like a simple enough task at an educational institution. That could not be any further from the truth.

Consider what the training space needs to accomplish:

- You will want to start training some time prior to your scheduled cutover. In our case we started several weeks before the official cutover date.

- You will want to train for some time after the official cutover date. In our case two months.

- We required to have dedicated training space for a total of at least three months. This time period covered both summer time and time during the cooler fall semester.

- Since we planned on keeping our class sizes to 20 or less, we needed several locations available concurrently.

- All the training classrooms were planned to have temporary stations in place for live training on the new System. This meant that we did not want to move the space once established. This in turn meant that it had to be secure enough to leave the stations there for an extended period of time.

The particular problems we ran into were:

- The University did not have enough classroom space even for our own basic requirements.

- Any available classroom space that was available was only for short periods of time. Nothing was available for the entire three months needed for training.

- Some schools and departments who had space offered it only under the condition that we used it to train only their staff members. They would not make the space generally available for the entire campus.

The problem of attaining training space was brought up to the highest levels within the University with no easy solutions available. Eventually we had no choice but to rent trailers, tables and chairs to hold the training in. Needless to say this was not in our planned budget. No one really liked the idea of our having the trailers used for training, but the idea was eventually approved since no one disliked it enough to make other space available. Problem solved? Not yet.

Getting approval for the trailers ended up only being the first step in providing a space to train the community in. No one on the campus wanted these trailers near their buildings or space. They were considered unsightly and by the nature of what we were trying to do, would add traffic to the area. Eventually, after pleading with Security, Facilities Management, Resident Halls, the Law School, our Faculty House, Health and Safety Office, the campus ambulance corps and someone who parked their car in

the only space we could find that was least objectionable, the trailers were delivered and installed. Between the University Facilities Management department and our vendor we finally installed the temporary telecommunications wiring and power to the trailers. The trainers, working out of the trailers, actually did quite a credible job under not so ideal circumstances.

There are many issues and problems as noted in the Training chapter, however, space could very well be your single largest problem in training the user community. Do not take this problem lightly if space is a problem in general.

PARKING SPACE:

Parking for the added crews to the Project will not be a problem for all other campuses. However, being in Manhattan in New York City, the issue of providing parking space for our vendor and the subcontractors became a major issue. The University already has a waiting list several years long for staff waiting for available parking spaces. As a matter of fact, parking privileges are sometimes decided at the highest levels on the campus.

Parking was a daily issue. I wish I had some sage advise on this problem, but I do not. The only thing I can tell you is that your vendor's staff will be traveling from many different locations, will be working late, weekends and holidays. It is to your advantage to make it as easy as possible for them to arrive in the most efficient manner, and for many that will be driving.

Chapter 5.

INSIDE/OUTSIDE CABLE PLANT INSTALLATION

WHY YOUR OWN CABLE PLANT?

The biggest and most difficult part of the entire installation process is that which involves the total replacement of the cable plant. It is this special aspect of installing a telecommunications system that places some of the telecommunications vendors into the construction business, a business they generally would rather avoid then be in. Several years ago I was informed by one vendor that this aspect of installing telecommunications systems placed them as one of the nations largest contract construction companies. However, in today's environment, in order for a telecommunications vendor to successfully bid for large systems, they must also include the cable plant and its associated headaches. Fear not, this aspect of their costs and headaches are in their bids for your business.

There are several very good reasons why you will have opted to replace your already installed Telco or other vendor installed cable plant instead of buying your imbedded base, they include:

- Your local telco just may not be in a position to sell you your cable plant. Talking to them and sending letters may have resulted in just plain old frustration in getting meaningful information to make a decision on. Even if they are legally bound to sell you your plant if you request it, that in itself does not have to result in a positive negotiation process. This process can be just as frustrating to your telco as it is for yourself.

- The quoted price from your Telco may be more costly then if you installed your own cable plant yourself.

- You may have reviewed in detail the already installed plant and decided it was either to old or poorly installed over the years for you to own and manage. If you have not come to this conclusion, or have not taken the time to review your currently installed cable plant, go check out some of the FDF's and BDF's around your campus.

- Your Telco may offer to sell the cable plant but without what you would consider proper documentation. No wiring diagrams or FDF/BDF/IDF or MDF wiring plans, what is used and what is available. Your cost to review and completely re-document what is already installed may be more expensive then to do a completely new installation.

- You may only be able to purchase pieces of the plant and not the ones you really need. If you will still maintain some private service or pay phones or leased data lines, these will just complicate the buying process.

- Your vendor may not approve of the installed cable plant for various reasons. Not least of which is that it does not meet the requirements for a digital switch installation. Remember that hardwired bridges in most digital switches do not work. They are replaced by software bridges in the switch that require dedicated pairs that go back to the MDF and switch for each station. If you have an analog system now and are switching to a new digital system, you will find that you have hundreds, maybe thousands of hardwired bridges on your campus that are not compatible with your new switching system.

- Your plans may include a different set of wiring schemes that require you to install your own cable plant. For example, you may require four or six or eight pairs to a jack or plan on including fiber or shielded pairs, you may require a different set of jacks other then that supplied by your Telco.

- Some states may allow your telco to require that you purchase the installed wire. Check with your local PUC or Corporation Commission.

I mention the items noted above for a reason. You should keep in mind the reason you did not buy your Telcos wiring plant as you install your own. You should be asking yourself as you proceed with the installation "how do I need to install this cable plant so that I would want to purchase it in ten or fifteen years?" If you constantly ask yourself this question, you will end up with a much better cable plant and one that is better planned, labeled and laid out. You force yourself to think about access and future maintenance and locations of cross connect boxes.

ACCESS, ACCESS, ACCESS:

The single most important factor that will determine the level of headaches and delays for the entire project may be access to the locations that need to be wired or have wires go through them. This includes dorm rooms, labs, offices, classrooms, closets and any other locations where a jack is going to be placed. In addition to the locations which are actually wired, you will require to work out access arrangements for the following areas: steam tunnels, storage rooms, mechanical rooms, maintenance rooms, closets of all kinds and places, basements, roofs and any and all other areas that allow or provide for an easy and installable path for your new cable plant system.

Who in your organization can provide access to all these areas? I suspect that no single department, including your Security Office and Facilities Office, has the keys to all these areas. There are literally thousands of doors that must be entered time and time again during the installation process. Many offices and labs will have had private locks placed on them and only the owner of the lock has the key and that person is only around one day a week. Although this may be against your campus code, it is likely to have occurred anyway. Gaining access proved to be the one most time consuming and staff intensive item we ran into. Why? Here is a list of events that may require access at one time or another to various locations, often several times:

- Original site survey for cable route and jack location.

- Actual jack and cable installation, this may take more then one day and one visit.

- Jack and cable testing. If jack or cable fail test, another visit by another crew to try and fix the problem.

- Station placement and testing.

- If station fails test, yet another visit for repair, maybe several to finalize repair.

Cable routes for risers and feeder plant installation may also require additional visits to various locations to complete the installation.

In a large installation, access problems are multiplied because you have multiple crews working at the same time. For example, we had several station wire installation crews working at the same time in various buildings while riser crews and feeder plant crews worked in others. Having this many crews working at the same time was the only way to have the cable plant installed in a reasonable time frame. All these crews required some type of access help of one kind or another. Between our vendor and our own staff we allocated about two full time people just to gain access to the various areas that we needed to get into. This does not include the "key-access staff" noted in the "Student and Dorm" section.

We ran into every type of access problem you can think of. From researchers wh would not let us into a lab for fear of our interrupting their ongoing experiments, to offices where someone was on leave and did not leave a key for access in case of emergency. We did not handle the access problems with one solution. Rather, the staff had to deal with it on a day-to-day and a case-by-case basis. It took much time, patience and perseverance. A less cooperative and understanding vendor could have reeked havoc with the situation, but ours worked with us and we persevered together.

We did not just accept the situation of difficult access. We took many measures that in some ways helped, but none of the measures we took solved the problem entirely. Some of the things we did to help ourselves were:

- We publicized the problem as much as we could in our Telecommunity Newsletter trying to get the full cooperation of all the Telecommunications Coordinators.

- We sent out detailed letters to the Deans and Chairpersons trying to get their attention to the problem.

- I raised the topic at almost every meeting I ever attended with University personnel.

- We tried to contact every department by phone when we knew what work we were going to do when.

- We posted signs in buildings we knew we were going to need general access to.

- We made arrangements with the house keeping staffs who had keys to get into offices and labs for cleaning purposes.

Even with all these measures, access to the necessary areas we were to work in was still the number one problem during the installation. If your campus does not have a strong central control on keys and other access devises, you must prepare and budget for staff to work around this constant problem. Further, make the problem as clear as you can to as *senior a person as you can* in the University or in your business. Even if they can not help, it is important to the Project that they understand the implications of difficult access and the problems that it causes.

THE WARNING

Do yourself a favor, as much as your campus staff will not like to hear it, get it out right up front with your entire campus; the installation process is noisy, messy, takes up badly needed space (daily storage of installation equipment and longer term storage of cable reels and other material), introduces a large number of strangers to the campus, takes time, some scheduled some not, be a general pain for access and security and will result in almost every piece of furniture and equipment on the campus getting moved or jolted at some time or another. This is the nature of a complete new cable plant and station installation. This may sound terrible, but it is the absolute truth about the nature of the installation.

I am absolutely convinced that if we had painted a nice, rosy picture and promised that we would stick to every schedule and that nothing would go wrong, we would have lost our credibility and cooperation right up front. We found that most staff appreciated the fact that we let them know the facts and were honest with them. They did not like it, but they knew what they were in for. You should do the same thing.

It is also important that your administration understand these issues. Almost any problem can be solved if you spend enough money. However, these problems are mostly short term and very likely do not warrant the extra expenditures except in very rare cases.

INSIDE PLANT INSTALLATION NOTES:

Inside plant work consists of the installation of the cable plant from the individual FDF's to the individually installed jacks. We call this cable "station wiring" or the horizontal floor wiring. Inside plant also includes the installation of the riser cables, those cables that run vertically up and down the building. It is the station wiring that causes you most of the access problems noted above. In our case we installed over 13,000 jacks and hence needed access to nearly 13,000 locations. The installation of the station cable plant becomes an acquired skill. We had to install cable in 75 buildings, some new some old. No two buildings were exactly the same. Our vendor would tell us their time estimates for wiring a building and we in turn would let the residents know the time frames we were working with. We never really learned until we were far into the project why we had so many problems with these estimates.

We understood the usual problems like access and running into unexpected asbestos (more about asbestos later) problems. What we did not realize until the project was well underway was the following: When our vendor gave us an estimate of seven days for a seven floor building, each floor with forty jacks, we would tell the user to expect us to complete about a floor a day. It never worked out this way.

When the first floor of work would take two and half days for installation we would loose all credibility with our user in that building and try and rework the schedule. As we reworked the schedule, the second floor would take one and a half days, the third

floor less then a day and so on. By the time the originally estimated number of days to wire the building passed we were very near the completion date. Sounds obvious now, but that's 20/20 hindsight and the purpose of this book.

What we learned from this process is that the installation crews experienced a learning curve in each new building they worked in. The longer they worked in a building, the easier and more efficient it got to do additional jack installations. Further, the nature of some of the historical and very old buildings made making the estimates very difficult. I can now state this observation after the fact. During the installation process with all the other events going on, it just did not fall together. Even our vendor did not make the association until very late in the process.

You can use this experience in two ways:

1 - You may make better and more accurate time estimates for how long and where in a building your installation crews will be.

2 - It is to your advantage to try and keep the same work crews together in a building until it is complete. The affects of the learning curve are lost if you place different installation crews into the same building on different days.

WIRE MOLD/RACEWAY

Many modern installations today include the concealment of installed station cable. This is generally done with some type of wire molding product. There are any number of acceptable wire raceway product manufactures in the market today. What was right for us at Columbia may not be right for you. You need to review with your vendor the different products available, the accessories that can be matched to the styles and colors they have and how they all fit together with your selected jack and jack box Some of the items you should consider when making the selection are:

- Does the product come in a color that is acceptable to your institution? Although our vendor carried a variety of colors, we standardized on one color and that was used throughout the campus. We decided allowing departments to try and mix and match colors would make for an impossible installation. Besides, I knew we would never have enough of the right color in stock for the necessary work.

- How will you secure the product to the varying types of walls you have on your campus? What types of walls will the adhesive stick to that comes with the product? For how long does the manufacturer guarantee the adhesive, assuming they agree you have installed it properly? I had nightmares of seeing strips of wire molding falling off the walls a year and day after our warranty was up. So did our vendor. We eventually agreed to secure all of the wire molding with screws in addition to the adhesive supplied with the molding. This is a more expensive operation, but will pay off in later years.

- Does the manufacturer sell a complete line of products for the molding? Right angles, left angles, two and four way splits, covers, various size molds, covers to allow smooth transition into your jack box? Do these add on's fit snugly on the original product?

- What lengths does the molding come? How easily do the lengths cut and fit together? Your installers will be working with miles of this stuff and need to be able to cut and fit it to each and every jack.

- How easy is the molding to open and close after it is installed? You'll be placing and removing cables in the molding for many years to come. Do not just test the molding out of the bag to see how it opens and closes. Get a few strips on a wall and try it then to see how it really operates.

- How well does the product take to paint? Like everything else on the walls, it will eventually get painted over. You want to be sure that it will take to the kind of paint generally used on the campus.

- In almost all of the considerations noted above, you have to decide whether to use all plastic, all metal or a combination of both materials for your wire raceway. Plastic is less expensive to install but may not last as long as metal. Metal raceway will be more difficult to install and may take longer. It is very important to get the installed price of these materials from your vendor. Metal raceway may be cheaper to buy but in total more expensive to install because of the labor.

How your vendor installs the wire molding is just as important as your selection process. The best selected wire mold will look terrible if it is run down the middle of a room instead of the perimeter. Check with your vendor for the rules they follow when installing wire mold products. If they look at you strange or ask what rules you are talking about, you have big trouble. See section on "Contractor Guidelines Book."

What kind of rules should you be looking for in the installation of wire mold?

- Provide for a standard now as to which way the molding opens after it is installed. Does vertical molding open to the left or the right, does horizontal molding open up or down? Make sure your installers know your preference and install it the way you want it done.

- If you are going to secure the molding with screws in addition to the adhesive, define a minimum of how many screws will be installed for how many feet of molding.

- When making penetrations from a hall to an office, agree that the penetrations are to be made in the corner closest to the wall where the jack is to be located and that the penetration will be made in a corner, not several inches away.

- Make sure your vendor has levels and knows how to use them. You want your molding installed in straight lines, both up and down and horizontally. Do not allow your vendor to "eyeball it", some eyes are better then others. Using a level is the only sure way.

- Agree before hand on how the wire mold will enter both the standard station jack you have selected and wall mounted phones. You do not want any wire showing between the end of the wire mold and the jack. A smooth cut and transition needs to be agreed upon and standardized.

- Agree to the maximum number of pairs to be installed in a particular wire mold size before the next larger size is required.

- You need to make some decision rules on how you will handle such things as bells and alarm boxes that may be in the way of a straight line installation. Will you install around the items, behind them or over them? Unfortunately this often becomes an item that is on a call by call basis. Work with your vendor and make sure you trust their instincts on these items. Otherwise you will have to have someone on call to make these decisions as they arise.

- When will you run the molding close to the ceiling and when will you run it along the bottom by the floor? Depending on the age and construction of different buildings you may have a different set of rules for each building.

If you are opting for the use of wire mold, and plan on total concealment of all cable, the correct installation of the wire mold will be the most visible part of the installation when you are through. You will have only one opportunity to get it installed correctly for all eternity. Make sure both your staff and that of your vendor understand this.

One last thing about the use of wire mold. Towards the end of your initial installation, try and make plans to buy from your vendor any left over stock and supplies of wire mold that are on the campus or near by storage. You will need it to do your own installations after the Project is completed for years to come. If you can get a better buy now from your vendor on the supply on hand, you should.

What else happens during station wiring installation? For one thing, wherever you have smoke detectors and alarms, your installers will be setting them off. During the installation process your installers will be drilling into walls, cutting raceways, tugging on wires in their way and all sorts of mischief. The dust and smoke caused by these activities may set off some of the more sensitive alarms. Get into the habit of letting your Security Office, or whoever monitors your alarm systems, know where you are working. This is especially true in dormitories where even false alarms generally result in a mass exit from the building, not to mention a large number of irate students.

New construction, renovations and alternations are an ongoing affair. Invariably, after you have installed your jacks, a construction crew will come around and cover up your newly installed jacks with plaster board and not think anything of it. One of the toughest jobs is coordinating with your Construction office those on going jobs that wil' affect the installation of the necessary jacks. This throws your schedule off and make your users very unhappy. You have to contend not only with your already very compli cated time schedule, but that of those areas under going their own construction.

It always seems that no matter how much you coordinate with the proper managers and supervisors, the guys doing the actual work never get the details straight. Your risers get cut out and the station wiring disappears. This is another one of those areas that there is little you can do except be aware of the problems and try to make others aware as well. Coordinating as closely as you can with the different construction and maintenance operations on your campus and publishing your ever changing schedule will help somewhat, but it will not eliminate the problem totally.

Working with different unions can be a real challenge. One story - A new building under construction during the initial jack installation was ready for our crews to come and do their work. When our installers arrived ready to work and with all their supplies we were notified that there was a $75 fee per trip to use the construction trade unions elevator. This took everyone by surprise except the new construction building project manager. Somehow I dug up $75 cash and it was presented to the elevator operator. The crews got into the building with their supplies and started work. I never heard anything else about the incident again.

The point here is that you need, or have access to, someone who has some working understanding of how the different unions on your campus will be affected by the work you have going on. If you are in the Northeast this is more important then if you are in the Southeast. Unions can be a problem especially if you do not take the time to understand who has responsibility for what. However, even understanding at times does not solve the problem.

One small example of knowing who does what. We needed a chain link fence installed in the basement of a building for storage purposes. After waiting for several weeks to get this job done I made an inquiry as to the delay. I was told that there were no plumbers available to do the job. I said that there must be a misunderstanding, I was trying to get a fence installed, not get any plumbing done. However, I was immediately straightened out by the shop. The fence was held up by long metal pipes that would be secured into the ground, since the work involved pipes, it had to go the plumbers union. Makes sense to me.

INSTALLING RISER CABLES:

The installation for riser cables presents some very interesting challenges. For one thing, the local laws on what can be installed in what kind of floor closet, i.e., can telecommunications wires be in the same closet as power lines, are always changing and at times not very clear. Another challenge is finding out that often architects never planned or expected the installation of telecommunications cables in some of the older buildings on your campus. Or for that matter, even the newer ones.

We had one thirteen story building being built during the installation process. We had recommended to the architect and engineers that they make plans for a standard floor by floor cable installation. No, they came up with a plan that required only two FDF's for the entire building and running cables between floors inside walls. We tried to explain the problems with this plan for future maintenance and additional installations of cable plant. The architects won out. I cannot wait for the first cable to be damaged or request for an additional jack in this building.

Generally you expect to find a straight path up a building to place your riser in. You should not be surprised to find that other cables are already in the best paths. Your local telco or other users on the campus have already found these out over the years. What might surprise you is that the architects left a straight path up from the first floor to the sixth, then crossed over several rooms and has a different path from the seventh floor to the top of the building. Worse yet, in some very old and ornate buildings, there may be no riser as we know it at all. The other one you will learn to love is the, "there was a riser but we used the space for an office and did not replace it because we did not think it was important" excuse.

In any and all of these cases, getting the riser cable installed is still your responsibility. Generally you can not remove what is already installed and the available space in the existing riser holes are not large enough to accommodate your new cable plant. The only reasonable alternative left is for you to core drill your own risers.

Now that you have decided what the alternative is, the fun begins in earnest. Where do you place this new riser? My first rule is generally to try and follow the best existing path in parallel as best as the space will allow. One problem with this is that the surrounding space in these locations is often filled with someone else's equipment already. Maybe your telco's FDF's or someone else's panels. You will need space not only for your riser cables, but for the associated new FDF's to run your station cable from.

Where you place your new riser now gets even more complicated. No one wants this thing in their space, especially in their office. If there are no other available closets to run the riser in you look to the halls. Now you really have troubles. Its bad enough to have one or two people angry because you want to invade their already small and

crowded office, but you will have whole crowds angry about this ugly box sitting in the middle of a corridor or hall. Never mind that the hall is already full of other departments junk from power panels and alarms to misplaced fire hoses and fire extinguishers. Your riser is the last straw and they will just not allow it to be installed.

Eventually you find a place and get permission. Not because anyone is happy with it, but because it has to be done and this is the only place for it to reasonably be installed. Your home free. All you have to do now is core drill the holes, install the riser cables and FDF box and terminate the cable.

The installation crew starts the first core hole at 8 am. They have made all the correct tests, have aligned the hole sights for the entire run, drawn their little circles on the floors and are ready to go. Thirty seconds after they start drilling you get an emergency call. An English class is being held next to where these crazy guys are doing some type of drilling into the floor and are making a racket. They must stop right now and only work between classes. Or, you receive a call from some researcher who claims that the vibration from the drilling is going to ruin their research that is in progress next door. Or, you have woken up an entire dormitory full of students sleeping the day away.

With some scheduling and reassurances you get on the way again. Maybe you have lost only a day, maybe a week. Does your vendor want to charge you for the lost time or for the time the crews had to leave the job site?

Problems solved? Not yet. Your crews are back and they are drilling their first core hole. Oops, what was that? Oh, we just cut a water line running right in our way of the first core drill hole. Stop work, get the plumber, fix the problem and find another place for the first core drill hole. Problems solved? Not yet. Next day the crew is back and core drilling the next floors first hole. Oops, what was that? Oh, we just cut another water line running right in our way of the second floor drill hole. Stop work, get the plumber, fix the problem and find another place for the second floor core drill hole. You ask yourself how many floors will you have to go through this until your vendor and crews see a pattern to this problem.

Prior to starting the risers, you and the vendor should agree on a process they follow to help prevent these types of damaging problems. Checking building and floor blue prints and diagrams will often let you know where water pipes and electrical conduits are installed. Your vendor should also have the tools to do some preliminary checking on their own; metal detection equipment or x-ray type equipment to test the site they want to drill into. Ask for the results of these tests when they have an accident like the ones noted above. Better yet, ask for it before you have problems to see if they are actually doing the testing.

Do not forget that once the risers are installed that the space around the cables in the holes must be fire stopped. If you wait till all the risers are completed to fire stop the holes you risk certain problems. Not the least of which is a fire. However, more than likely you'll get a complaint that the janitors sink in one of your FDF's ran over and the water found its way down one of the holes you left open. To be sure, one of your own FDF's was just below and now you have water damage in your closet that you now have to fix. The lesson here is to fix and patch as much work as you can as you go along.

Installing the riser plant is another one of the many critical items that will either make or break the installation. The above stories are intended to give you an idea of the level of detail that is needed in the planning of this aspect of the installation. There

are no specific details of information that I can offer other than to reinforce the need for you to provide the appropriate level of attention and planning to the installation to risers as you do to other aspects of the installation. Risers are boring, but only after they are installed.

One idea for action. Try and place at least one 1 inch spare sleeve, with bushings, at each floor core hole for future cable installation. If you need to run fiber or some other LAN medium at a later date, it would be nice to have the ability to go between floors without disturbing the rest of your cable plant. The 1 inch sleeve will accommodate almost any kind of cable for future use. The cost of these sleeves should be minimal and will have a great pay back.

CONTRACTORS GUIDELINES BOOK:

If the inside cable plant is going to be consistent from start to finish, you or your vendor, depending on how you negotiated your contract, must supply an "Installation Guide". This is a binder or set of binders that contain all the agreed upon methods, guides and rules to adhere to for the installation crews to follow. It should include the specifications for how wire mold is to be installed, how many screws per linear foot of wire mold are used, the tools used for cutting wires and molding and making sure that items are installed in straight lines. How are preparations made into walls and where in rooms you generally want the molding to run and jacks be installed.

The Guide should include actual drawings and diagrams of all the pertinent details of the installation. The more specific the Guide, the better the overall installation can be.

You want to make sure that all the different crews coming on and off the job know exactly how the jacks are to be wired. You may have selected a wiring plan specific to your organization. You may be installing various types of cables that need to be cross connected differently at the FDF and BDF's then is normal practice. If you and your vendor have agreed on space for growth in the FDF's and BDF's, you want to make sure the installation crews actually make room for that growth.

The "Installation Guide" is your and your vendor's protection to make sure that the installation crews are all given the same information and hence a unified installation. Without a single guide like this you run the risk of having crews come to the job for just a few days and start doing work that does not meet your specific rules. If this does happen, you are at least protected by the fact that they had the Guide and must come back to correct what ever work has been done incorrectly.

The Guide has a secondary purpose, it can act as the basis of training your own installation crews when it is your turn to maintain the cable plant. It is equally important for your staff to continue the same standards established during the installation. Remember the point of "would you want to buy your cable plant in 10 years?"

OUTSIDE PLANT INSTALLATION NOTES:

Outside plant usually consists of those cables that run between buildings and/or cross streets. How and where these cables are installed on your campus will very much depend on the size of the campus, the proximity of the buildings to each other, the availability of steam tunnels and empty or otherwise usable conduits and the necessity to cross public streets.

The method you use for the installation of your cable plant will also be dependent upon your particular circumstances. The options run the gambit from stringing the cables to poles (which is rarely done these days), direct burial, running them in buried conduits, in cable trays, strapped to stringers or to any and all available pipes and other paraphernalia. Some of these methods are dictated by circumstances, others by a combination of cost and circumstances.

The one caution I will make that you should consider during this decision making process is the following: As the technology of telecommunications changes so will the need to install other types of transportation medium, whether it be coax, fiber or some other medium. To accomplish these later installations, you should try and plan to provide easily accessible pathways in your feeder distribution plant. This generally means installing extra conduits in street crossings and over sized cable trays in steam tunnels and basements.

If you do not take the opportunity to make these pathways now during the initial installation, you will pay for it later at a much higher cost. That cost will be in both money and the inability to provide enhanced services as the transportation medium changes.
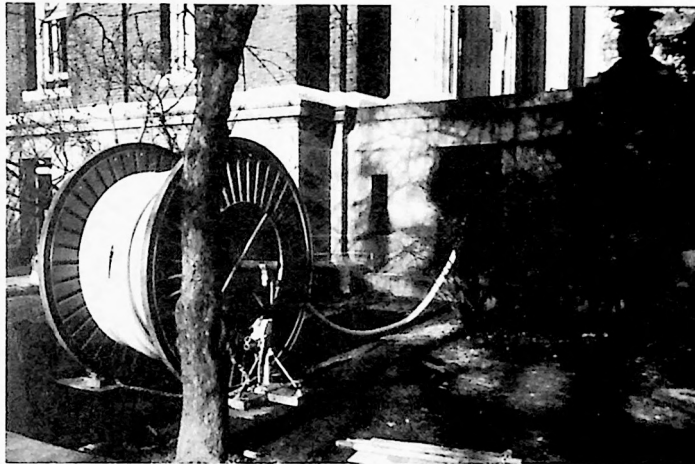
STREET CROSSINGS AND TRENCHES:

Street crossings and trenches are the bane of every campus that is not contiguous or does not have sufficient basements to install all the feeder plant in. Managing the process of getting street crossings and trenches done correctly requires patience, diligence and unending follow up. This is one process that is generally very large and open to the public eye and scrutiny. Here is list of gotchas and things to look out for.

● All permits, licenses or franchises for street crossings or microwave licenses should be applied for immediately or at least as early as the Project will permit. They always take longer to obtain then you expect or reasonably should. A fall back position is a good idea if the permits, licenses or franchises are not provided or approved in time for your planned cutover date. We learned that you can sometimes get insurance bonds that will allow you to do the work subject to the work being undone by the appropriate jurisdiction if the permits or licenses are not approved. You can investigate this option with your local municipality.

- If your installation is in a large urban city, get an expert to work with you on obtaining the above items. Trying to figure out the maze of forms and departments without this help could add months to the process or prohibit you from getting them at all. You never know what committee or community board will get involved with the process. If any of them have an axe to grind with your institution, they can slow things down to a standstill. Having an experienced expert on board from the beginning of the process will help move things along and help them have a working familiarity with the Project. This working familiarity can be helpful if a public hearing is required or a presentation to some community board.

- Permits, franchises, and licenses are sometimes approved but they are not delivered to the appropriate place or the right persons are not notified of the approvals, so those that are waiting for the information never get it. You must constantly follow up on the status and where in the process your request is.

- Sometimes work permits, the items your contractors usually need to start work, are only approved after franchises or licenses are granted. Getting the correct work permit can also take weeks to get. So that when you have the franchise or license, all is not done. Understand the process and the time parameters. If you do not, you can not count on your master schedule meeting your cut over date.

- Landmark buildings, know which ones they are and what rules apply for doing work in or around them. Although you will very likely need to depend on other departments to know about these things on your campus, in many cases they may not know all that is necessary. The last thing you want is to start work in some building just to be stopped by some good samaritan who reports you to the local Landmark Commission because they believe that you have not received the Commissions approvals first. It is much easier to get the Commissions approval before you start then to get their approval for work you have already done. Once they get it in their minds that you have snubbed them, even if it was just an oversight, its an up hill battle all the way.

- Identify as early as possible the specific areas in the buildings your are trenching to. Into what room, wall and where on the wall are you going, where from the penetration in the room are you going and how are you going to get there? Your vendor may assume that all and any routes are OK with you. If you are drilling into mechanical rooms or offices you may need to provide for dust by covering the equipment. If there is HVAC or ventilation equipment in the room it may have to be turned off before you drill into the room to prevent the dust from getting into the system. You'll have to check with the owners of the space for their approval and to make sure you are not going to interfere with any of their plans.

- Street crossings and trenches must be accomplished in a contiguous manner. This may be contrary to the way your vendor plans on getting the job done. They will generally want to open up all the streets and get the conduits and cables laid then come back and fill the streets and holes in the building penetrations at the same time. The problem with this method of getting the work completed are several:

   Building penetrations that are not immediately sealed will leak water when it rains and may allow rats and other undesirable animals and rodents into the building. If the penetrations are big enough, certain undesirable people may find there way into your premises. You may be stuck with open building penetrations for weeks while you wait for the balance of the street work to get done. If the penetrations were made in areas where staff work, you have an even larger problem if they are not sealed immediately. If it is winter they will get cold, summer they will get hot.

   Steel plates that cover street crossing trenches will have to be used until the trench is properly filled. As heavy as these plates are, they are subject to movement as traffic travels over them. Don't wait till you get calls in the middle of the night from neighborhood residents complaining

that the metal plates are making noise each time a car or truck rides over them and is preventing them from getting a nights sleep. Better you get the nights sleep and keep the use of the steel plates to a minimum.

Unfinished street trenches break cars. Instead of steel plates your vendor may try a temporary filling for the street trench. Our experience with these is that they do not last or work well. These temporary fillings are either too high or sink too low. In either case, they reck havoc with traffic and your cars shocks. This was made very evident to me one morning at about 6 AM as I drove over one of my own street crossings that almost knocked me off the road.

● Know who has signature authority from the vendor to sign off that the work has been completed. Know what their reference material is for signing off for the work. Is the person who is signing off that the work was done properly using hand drawn drawings not to scale? Or professionally engineered blue prints that show all the correct specifications? How do changes in the field make their way to the final as built drawings? You need to know how they verify that the sealing for the building penetrations are done correctly and water proofed, how deep the conduit has been installed or the cable buried, has clean sand been used for fill or just the old dirt reused? You do not want to dig up streets after the work is completed to confirm that the specs were met.

We had one street dug up so many times we lost count. This was because we could never get reliable and accurate information as to how the work was done and the specs of the completed job. The contractor doing the work would provide incorrect or inaccurate data. Plus, after a month of close and daily coordination, the actual street work we were waiting to get done was done with no one's knowledge. Agreeing to coordinate and actually coordinating are two different things.

● Coordination becomes especially important if you are attempting to install conduits from opposite directions and meet somewhere in the middle. We tried to do this with two different contractors, one doing a street crossing, the other installing conduits on the campus to meet the conduits coming off the street crossing. The accompanying picture should tell the tale better then I can describe it. The conduits missed each other by at least 10 feet. We had these contractors talking and coordinating the effort with each other every week. It was not enough. It is important for the crews doing the actual work to know what the intended end result are. The crews told us that if they knew that we were trying to match the work going on elsewhere that they could have coordinated the work better. W relied on the contract supervisors to instruct the crews properly.

Not everything for the contractors is fun and games. At one point we had to survey an alley for a feeder path. What we did not know is that the building was protected by guard dogs. The crews doing the survey just barely got out of the way of the dogs in time. The crew members complained of the dogs almost giving them a heart attack. We found another path.

You have to be forever on your toes. A case in point is the story of the "never ending cement truck." We were filling a gaping hole in one of the foundations of a building we drilled through to get a feeder cable in. The vendor squared off the space for the hole and backed up a cement truck and started pouring, and pouring, and pouring. The cement truck operator did not think anything of the amount of cement this seemingly small hole was taking. Fortunately a University Project Manager was present and did not think the same way. After some investigation we discovered that the cement was also pouring into the next room. Although we will never know, I'm told that a second truck would have been called up and we probably would have filled this other room up with cement before anyone thought anything was wrong.

ASBESTOS:
WHERE DO YOU FIND ASBESTOS? - EVERYWHERE!
If there is one single item that has the potential for changing the way cable plants are installed and maintained, asbestos containing materials (ACM) is it. ACM is almost everywhere, no one is immune to its presence. New, not so new and old buildings are

just storehouses for this material. ACM can be found almost anywhere, it can be found in varying types of tiles, ceilings, heating systems, pipe lagging and sprayed onto the structure of buildings. It is also considered very dangerous.

The laws on how to handle ACM, remove it, contain it and work around it are always changing. During the time of our Project, the cost to remove ACM more then doubled. Further, the New York City ordinances dealing with ACM changed several times making it very difficult to plan from building to building as we progressed with the installation.

An awareness of ACM on your campus is absolutely imperative to your project. If you do not have expert hygienists on your schools or company's payroll, you'll have to go and contract for one. What you do not want to happen is to start the Project and then have either your staff or your vendor discover that there is ACM in the pathways for your cable plant. You'll end up with a panic stricken faculty and staff or a vendor contractor who will refuse to work with you or both.

We were fortunate in that the University already had on staff an expert hygienist. As a matter of fact we had two. However, with all the work going on around the campus at the same time we had to also hire a contract ACM consultant. Hiring a ACM consultant is an expensive proposition. There are two reasons for this being expensive;

1. Contract ACM consultants are just expensive by the hour to begin with. It is difficult to negotiate a fix fee contract for an unknown situation, which is what your ACM problem mostly is.

2. A contract ACM hygienist will almost always take a conservative safety approach to your ACM problems. To avoid future suits or problems they may recommend complete ACM removal when containment may have been enough and within the law. Generally removal is more expensive then just containment methods.

The best way to prevent ACM problems is to avoid it. There are almost always other paths to take or routes that will avoid most or all of the ACM in your tunnels and buildings. However, our experience was, when it is present and must be dealt with, do it honestly and openly. Trying to hide the problem only causes more suspicion by your contractor and the staff that may be in the affected area. Once you are caught cutting corners, or concealing the fact that there is ACM, you will have a lost a valuable ally in your vendor. They have to work with you on finding the paths of least resistance and may then insist that all areas with potential ACM problems be air tested or insist that special protective suits must be worn, ultimately increasing your costs.

At the same time that you do not want to hide the fact that there is an ACM situation, you do not want to cause any undue concern either. We had much of the removal and containment work done on weekends and evenings so not to panic or provide unnecessary fuel to the staff's concerns. Often the preparation for the removal/containment of ACM is quite visual. Lots of plastic tarps sealing up the area, air pumps and showers installed and staff walking around in protective suits, protecting themselves but not the people watching them. All this preparation can be unnerving to the uninitiated and cause more problems by the removal then you bargained for.

Having ACM crews working off hours has its problems also. One weekend we had a crew assigned to meet a person with a key by an elevator in a particular building. The key person and the ACM crew were at different electors in the same building. After waiting several hours they finally got together only to discover that the elevator they were to use did not have a stop on the floor they were to work on. To get to the elevator that did stop on the floor required the use of a freight elevator on the main campus. It was out of order. We ended up walking the materials and all up the six flight of stairs and taking twice as long on the job then expected. We had many weekend and evening jobs that went this way.

There are several alternatives to handling ACM problems:

1. As noted above, the best alternative is to try to avoid it. We dug trenches, changed cable routes and did anything else that was financially viable to avoid dealing with potential ACM areas. However, even with all these alternatives we still had to spend a considerable amount of time and money on the other alternatives.

2. Containment/encapsulation. Sometimes it may be possible to contain or encapsulate the ACM problem. In this process abatement companies or trained and qualified personnel may come in and encapsulate the ACM such that it allows you to work safely around the material with no exposure to the workers or disturb the already installed ACM. There are two potential problems with this method;

A. Even though it may be possible for you to have the ACM encapsulated, the material may still be in the way of your installation crews who may still disturb it with the installation of heavy and difficult to maneuver cables. This is where you need to talk things out with your vendor and the installation crews.

B. Depending on where the ACM is and the local laws concerning abatement, it may be just as expensive to remove it as it is to contain it.

3. If you can not go around it and the ACM can not be contained, then your last choice is removal.
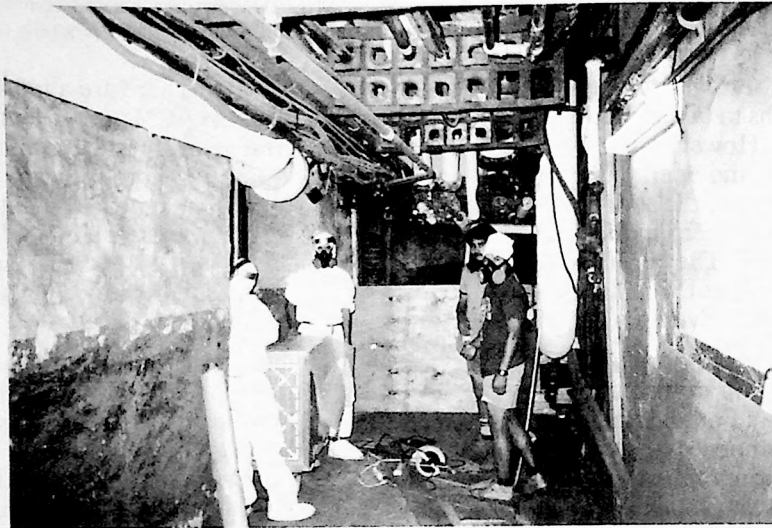
A note about real versus imaginary dangers in regards to ACM. Not all ACM is dangerous or needs to be contained, removed or avoided. ACM is all around us and not all of it is dangerous in the currently installed state. For example, if you have pipe lagging that contains ACM and the lagging has retained its seal and there is no exposed ACM areas in the lagging, it may be possible to safely work in that area as long as you are not going to puncture or damage the seal on the lagging containing the ACM material. You will have to work closely with your hygienist and vendors so that all party's agree as to the status of things and that working in areas with sealed or non-exposed ACM will work to everyone's advantage.

Not all ACM has to be seen or in the immediate area to be a problem during the installation. Some ACM in years past was used as a fire retardant and sprayed directly onto the steel structure or other parts of buildings. At times, the vibrations your work causes may result in this type of ACM being made air born and hence a working hazard not only to the staff in the immediate area, but others around the vicinity.

As you can see, asbestos containing material can be a major factor in your installation process. This is an area of concern that requires you to defer many of the decisions to the experts in the field. You can not and should not attempt to make these decisions concerning ACM on your own. Only specially trained and educated individuals can correctly identify and assess the problems and the extent of the danger to the people involved. Your job is to be as educated on the subject as you can be and help contribute to the alternatives that are within your power. The risks of not paying the appropriate attention to this subject can be catastrophic.

It is this author's considered opinion that ACM problems can become one of the deciding factors as to whether or not a new telecommunications systems can be successfully and economically installed. As more and more companies and Universities look at installing their own systems, vendors will have to increasingly become adept and

knowledgeable in working with and around ACM situations. Otherwise they risk having their installations stopped cold because of the increasing costs and problems of dealing with the increased awareness of ACM and its associated medical implications.

GENERAL INSTALLATION NOTES AND STORIES:

TRAFFIC AND SAFETY CONTROL

Pedestrian traffic and safety control tools and devises are the responsibility of your vendor while they are performing the installation. You should count on several things,

1. your vendor will never have enough cones, barriers, blinking lights and/or safety tape to protect your students, staff and pedestrian traffic,

2. you will have to be constantly on your guard that these items are being used and placed responsibly, and

3. traffic and safety devices will be moved and stolen.

This is doubly important, the actual cable and plant installation can have a number of individual events that are actually dangerous to both the teams doing the installation and the pedestrians that may be around. Both have to be protected from each other. While your crews are installing feeder cables from large and heavy cable reels, there are periods of time when there is considerable tension on the cable. An accidental knock or slip can be very dangerous if a cable weighing several hundreds or even thousands of pounds is let go or snaps and is allowed to move uncontrolled. Traffic control is necessary for all involved.

There are safety precautions and there are safety precautions. Depending on your level of concern and local laws concerning these things you will either have to go out of your way to protect those that can not protect themselves or open yourself to potential law suites. For the most part, use of some common sense will do much to improve the situation.

○ Barriers for open holes and pits along walking areas need to be blocked several feet from the actual hole and cover the entire area of the hole along the walking path. Without a solid barrier kept several feet away you risk a blind person or someone with very poor eyesight actually falling into the hole or into the piles of dirt and stones taken from the holes.

❷ During the day, at an active installation site, it is not enough to just place some red tape across a doorway or ramp or in the process of trenching. Actual barriers and signs should be used. Unfortunately you also have to protect your public from themselves. They will walk over, under and through almost any barrier you place in their path. Your job is to do everything within you power and budget to protect the public and the working crews. There will always be someone that will insist on walking right through your work area and get hurt or slip and fall. If you have done your job, the accident should not be a cause of alarm for the Project, although a little sympathy I guess is always appropriate.

● Walkways need to be kept usable in one way or another. Asking people to use the street as an alternative is usually not acceptable. Alternate pathways should consider that disabled persons and especially ones in wheel chairs may need to get by. Taking up a sidewalk and placing a two foot path

will not allow a wheelchair or other disabled persons to cross over. Blind people need to be protected by having solid barriers far enough away for them not to encounter the danger prior to meeting a barrier.

- Dark areas left open or with piles of rubble and/or dirt at night are just inviting an accident. Blinking light barriers are a must.

- You cannot leave large cable reels, full or empty, unprotected. Cable reels just attract those that want to see how fast they will roll down a hill or what happens when they hit a tree or wall. Moving cable reels can be very dangerous if not supervised properly. Cable reels need to be secured when not in use. This issue with cable reels includes those left behind inside buildings, such as riser cable reels. A full cable reel can easily smash in an elevator door if allowed to roll fast and far enough.

The most successful installation can be marred by some accident that could have been prevented by just a little diligence and insistence by you and support by the vendor. You both have to work at it for the entire installation. You need to bear in mind that your telecommunications project will effect your entire building and/or campus and will also be very visible. Your Project will very likely be held to a higher standard then other projects. It is seen over and over again and small mistakes and errors are visible to all to see around the entire campus.

OVERTIME AND WEEKEND WORK:

If you go through your entire Project without working any weekends or evenings you are indeed very fortunate. However, I would not count on it. There are many reasons for overtime and not all of them are because you fell behind in the schedule. There are likely to be events and places that you would rather avoid during normal business hours, such as ACM removal talked about earlier. Overtime work brings along with it its own set of problems and concerns.

- If you have access problems during normal business hours you can count on the problems getting worse during overtime work. Do not leave it up to your vendor to work things out with your Security or Facilities departments. You should have someone on your staff familiar with the problem and the know how to get doors and elevators opened during nonbusiness hours.

- Make sure that the subcontractor and the vendor each have proper supervision during the extended hours. As much as possible, the supervision should not be the same staff that has been around all day or week. They will soon tire and not be as effective as you will most likely need them to be. Failure to provide proper oversight and supervision can result in the overtime creating more problems then they solve. The wrong area is cleaned of ACM or a trench is dug in the wrong place.

- At times work done on overtime is not of the same quality as that done during the normal work week. Weekend production is usually not what the week day work production is. There are fewer people around to solve immediate problems, out of service elevators, elevators that due not stop on the floors that the crews want to work on... If you are working overtime you should have specific goals for i' and the appropriate plans in place to measure the work getting accomplished on premium pay.

- On weekends, you should have your own staff present to help and supervise the work of the vendor when they need to work. This is to handle access and other problems, i.e., the elevator breaks down. Unsupervised work on weekends has a higher probability of not getting done. Crews do not show up and you do not find out about it till its to late to do anything about it.

Hopefully you recognized the possibility for some overtime work in your contract and the budgeting of the time does not also become a factor. There are a number of operations you would prefer to be done on overtime then not, a number of them are;

- Any work that involves ACM in public areas you would very likely want to schedule during off hours as noted in the asbestos section.

- Some offices just may not be available during normal business hours. The Presidents Office or the Provosts for example may be better handled during a weekend or evening.

- Access to classrooms may not be able to be scheduled during the day because they are booked solid. Often they are used in the evenings as well.

Not having the ability to schedule overtime will only add to your many headaches.

CLEAN UP AND GARBAGE

There are several stages of clean up and garbage removal for the installation. Each of these stages has its own set of problems.

- - Inside wiring. Your installation crews will have a significant amount of material which they will be using to accomplish the actual inside wiring installation. This may range from empty cable reels from the station wiring to long boxes left over from the wire mold. Generally your regular house keeping crews are not geared to dispose of this type or quantity of trash. We literally had thousands of reels

to dispose of from the station wire and thousands of feet of boxes from the wire mold. If you do not make plans for the disposal of this material up front it will become a major problem and embarrassment to the Project. In our case we were fortunate in that we negotiated with our vendor as part of the contract the removal of trash from the premises. However, even with the responsibility of this factor being the vendors, there is always the problem of storing and moving the trash until it is taken off the premises. No small matter when the job is a large one and concerns dozens of buildings. To avoid problems. make sure that you plan with your vendor and who ever is going to remove the trash every detail of its movement from the time the material is empty till it is removed from the premises.

Inside wiring has its own special set of problems with clean up as well as the removal of trash. The crews working on the inside wiring have a particular problem in that they will be working in offices, labs, halls and corridors, closets and classrooms. These are places that have a high amount of visibility. During this part of the installation they will be drilling into walls and woodwork causing a fine dust, cutting back wires and leaving small snippings on the floor, cutting wire mold and having odd shaped pieces left over and all sorts of small and out of place pieces of trash that are residual to the installation.

Most crews do not carry around with them a dust buster for clean up purposes or brooms to sweep an area clean after they have completed their part of the job. However, if your crews are allowed to leave these small messes behind after they have completed a top notch installation job, guess what will be remembered? Whether you work out something with your housekeeping staff or force the crews to do their own housekeeping, the clean up after any part of the installation is critical to the perception of how well the job is actually being done. Remember that perception is often more important then the actual performance.

- Distribution cable. The large six and seven foot cable reels that are empty need to be stored out of the way and disposed of on a regular basis. If you allow them to accumulate you will never get them all out at the same time. Your trucker will only have so much room on his truck and will leave behind as many reels as will not fit on his truck. Odd pieces of cable trays that have been cut and are no longer usable can not be allowed to hang around until you are asked to remove them. Basements are very easy to use as a dumping ground. Keep in mind that your material will be very easy to identify and that sooner or later you will be collared as the owner of the misplaced trash.

- Switch room. The switch, the MDF, the tip and switch cables, the cabinets, the files, the books, terminals and more items then you can dream of will all come in boxes and crates. You need to have the facilities to remove large amounts of trash. Some are going to be heavy and large boxes that may require special handling. Otherwise the space outside your doorway switch room will turn into a trash center.

- Station placement. We installed almost 10,000 stations, each station coming in a box, each box measured about 6 inches deep, 18 inches tall and 18 inches wide. With several hundred stations being installed on a daily bases, you have almost a mountain of boxes to remove. Not only is this a large chore, but it can get expensive as well. As with all you other trash removals, this must be planned in detail for every day and each building. Getting this much trash moved to one location to be removed is a task almost no one wants.

Keep in mind that piles of trash, yours or someone else's, attracts other trash. If you do not take care of your own, you may get yourself into the position of taking care of others trash problems along with your own. The longer you leave your trash lie

around, the better chance you have someone else leaving theirs with yours. Who wants to start separating trash to determine which is yours? You not only need a plan for handling your trash, but it has to be timely as well.

A word of caution. Your campus Fire Prevention Officer will either be your best friend or a constant reminder of how much of your trash still has not been taken care of since his last review of a particular area.

Another note of caution, garbage is not always garbage. If your not careful you can through out the good with the bad. Columbia has thousands of feet of tunnels all over the campus. Our vendor was not only using this space for the temporary storage of cable reels, but for the storage of cable trays, empty pallets which had contained the FDF cabinets, wire molding, station wire and much more. When we finally got them to clean up the garbage they had left all over the campus under threat of stopping the Project, we had to be very careful that the trash remover did not take some of the good installation items still left in the tunnels for storage as trash. At times it was difficult to tell the difference.

MISCELLANEOUS ITEMS:

Often, drilling causes dust, a lot of dust. Different materials cause different varieties of dust. If you are drilling into cement, dust will get into everything near where the work is going on. No one ever thinks of covering things until its to late. Drilling dust gets into everything. This is especially important if you are doing any drilling work in your switch room. If you need to make larger holes in your floor or ceiling for more cables or for any reason, protect your equipment. Wet drilling helps to control dust, but many workers only think about it after the fact. Further, wet drilling only controls some of the dust and does not guarantee that none will be airborne and get into you' equipment. Wet drilling has its problems too. You have to know what is below the spac that you are drilling so that the water does not do more damage then the dust you ar trying to prevent.

The same concern for drilling dust must be considered when creating new risers and you are drilling between floors, or when you are drilling into basements to make pathways for your feeder plant. As noted above, if you allow dust to get into mechanical systems or HVAC systems you are asking for big trouble. You and your vendor must constantly be on the look out for the surrounding area and the impact you may have.

An item that is even more difficult to control then the dust caused by drilling is protecting the project from being blamed for damage that was caused by someone else or prior to you beginning your work. Cracks and holes in walls, nicks on furniture, ceiling tiles missing, torn carpets, dirty walls and everything else that could have been caused by your work. You will get blamed for it. We were accused of damaging a 100 year old chapel by causing cracks to develop in the walls, even though the damage was done years before by another construction project. Because of the controversy, and the fact that this developed into an emotional issue versus a factual one, we ended up using an entirely different route to avoid the chapel in question.

You have to instruct your crews to look for areas of possible contention prior to doing any major work. Take pictures of the area, if you have to, so you can have before and after shots of the area.

If your campus is large enough you will never know all the time what special events are going on where. One thing for sure you can count on is that campus events will almost always take precedent over your needs for space, access, elevators and scheduled time. One example are the duPont Awards ceremony that Columbia hosts each year. We knew that the ceremony was coming, what we did not know is that the building housing the ceremony was virtually cut off for almost a week prior to the ceremony. Once again our schedules were changed to accommodate the University at large. Hopefully you will have an idea of most of the scheduled events on the campus and will be able to work around them.

From time to time during the installation process, you may need to allow another subcontractor, other then your vendor's, to install parts of your cable plant. This could occur if you are having a major renovation project going on or if a new building is going up. There could be conflicts of unions, or the other vendor could just do it more less expensively then you can. Whatever the reason for your not having control and final responsibility for the installation, make sure that the new subcontractor has in writing your installers standards for the installation and that they live up to them or do the installation over. You may want to have your telecommunications vendor inspect the work to verify that it was done to their standards. This will assure that later they are responsible for the working of that part of the cable plant. We had several instances where we allowed a vendor other then ours to do installation work. We were never satisfied with the finished installation.

Idle hands will get into trouble. When your vendor's subcontractors have nothing to do because they have completed an installation early or are waiting to get into some area, they will play with something they are not supposed to or do something you do not want them to. You need to have a place for your vendor's crews to go for these time periods if you do not want them to leave the campus. What you do not want is for them to just hang around the work place with no work to do.

If your vendor is responsible for patching up the work they do, it can be months between the time they do the actual installation and when the patch work gets done. In the mean time you will have a number of very unhappy users. If it is at all possible, you should try to have your vendor do the follow up painting and patching right behind the installation crews. This sometimes makes for a coordination problem, however, your users will have far fewer complaints about the installation overall.

Theft of your vendor's and subcontractors tools and equipment can be a major cause for concern. Many of their installation tools are quite costly and valuable. Although they are probably covered through some insurance plan of their own, thefts always cause a delay and sometimes an unfriendly attitude. It is sometimes not enough to tell a vendor that their equipment is just as safe as yours, especially if its mostly theirs that is getting stolen.

One program you may want to work out with your Security Office can be as follows: Paint large identifiable numbers on your vendor's gang boxes. Each night before the installation crews leave for the day they report to the Security Office the location and number of the gang box they are leaving. Your Security Office can then add the gang box to their evening rounds. The numbering of the gang boxes helps to identify any box that may have been moved from another location.

Your own Facilities department and that of your vendor must communicate and work in concert with each other. Otherwise they will get in each other's way and possibly undo each others work. We had one situation where we installed some cable trays in the basement of a particular building. Another crew of pipe and steam fitters came by a few days later and installed water pipes over and around our already installed cable tray. The way the water pipes were installed affectively blocked us from getting to the cable tray for installation purposes. Further complicating the matter was the use of our struts holding up the cable tray for support of the water pipes. We ended up installing a second set of cable trays under the one already installed. Not a satisfactory solution for anyone.

On another occasion we had a specific plan as to where a particular building penetration would be made for a feeder cable. However, the contractor made a field decision and went through a different wall. Unfortunately the penetration was made in a load bearing wall well after arrangements had been made to do otherwise. This caused a week of finger pointing and some more bad press for the Project. The whole thing could have been avoided by the contractor placing one call to the appropriate party.

Communications between your vendor and your Facilities/Construction department must be constant and supervised. You should remind them that they are not doing each other favors, rather they are working toward a common goal and will save each other a great deal of grief in the end. It is your job to foster and supervise this communication.

Because you and your staff have a long term stake in the installation, you will become your vendor's best source of information on what is good and bad about what is going on with the installation. Your vendor's staff may not readily tell their management some of the things that are not going well or correctly. Often you and your staff will find out about them out sooner then they will. In this way you keep the entire Project Teams on their toes and also foster better communications.

You and your vendor will very likely be held to a higher standard of work then the rest of the University. We instructed our vendor when trenching on the campus that they could not block off an entire sidewalk at one time. So in an effort to comply, they generally did half a sidewalk at a time so as to allow access to the other half. This was done time and time again, much to our agreement.

A few months later, the University had a project that required a long and wide trench for the installation of water pipes. Almost every rule and guide we had made our vendor adhere to during their trenching of the campus was ignored by the contractor doing the water pipe installation. Our vendor noticed this and made mention of the work now being done by another campus contractor. What our vendor did not know is that I received a call from the President's Office about the terrible job that we were doing with the most current Telecommunications trench. I was very pleased to inform the President that we had completed our work without any mishaps and that the work he was referring to belonged to someone else. Our diligence did pay off.

When installing spare conduits, take the extra step of installing inner duct in them. This inner duct will allow you to better utilize these conduits in the future and make their availability for things like fiber and coax more reasonable in the future. The cost of inner duct varies, but will usually have a good pay back in the future.

MISCELLANEOUS ITEMS:

The inside/outside cable plant installation is the largest aspect of any telecommunications system installation. It takes the longest period of time to accomplish, is the most visible and may take upwards of half your budget. It deserves your fullest attention to detail and supervision. When managed correctly, you can have a cable plant that someone would still want to buy in ten years.

Chapter 6.

SWITCH DESIGN AND FUNCTION

Your new telecommunications system is very likely the most powerful and versatile piece of new computer equipment you will introduce into your working/teaching/research environment on a corporate wide basis this century. When you start to consider all the available features and service enhancements of your switch, network and the peripheral equipment, the end result can be mind boggling. Keep in mind, as true as this is for you, it is even more so for your user community.

This virtual explosion of technology is especially true when it comes to telecommunications systems. Your local telephone company may have been calling a certain set of features by one name for the past umpteen years while your newly selected telecommunications vendor calls the same features by another. The permutations of how you can implement station call forwarding, system call forwarding (no answer and/or busy), variations of intercoms, paging systems, use of authorization codes, classes of service and a new plethora of features that you may not have had available at all for your user community are now almost unlimited. Along with all this new technology and feature availability comes new responsibilities to bring it to the user community in a comprehensible manner.

FEATURE PACKAGES:

One of the ideas that we implemented at Columbia very likely accounted for a great deal of the success that the installation had. Taking into consideration what I just noted above, we did not permit the user community to pick and select from the hundreds of features and combinations of them for themselves. There was just no way for us to train and educate the entire user community in the available time frames to allow full access to all the system features. This would have caused total chaos and have been virtually impossible to install.

Instead, we developed what we referred to as "Feature Packages". A Feature Package is a preselected set of features and capabilities built into a particular type of station. Since we only had three types of stations, a single line set, a multi-line set and what we called a departmental console, developing the feature packages presented a very interesting problem.

We knew we had to develop sufficient feature packages to allow most departments and users to find an acceptable fit while still providing fuller and more enhanced telecommunications services. Those users that did not have a perfect fit had to be able

to survive until such time that the other features of the system were made available. To meet this objective we used two tools to review how we would develop the Feature Packages:

- The first tool was a list of the Centrex features already being used on the current analog equipment. To our surprise, there was not heavy use of the available advanced Centrex features other then variations of station forward and some hunt groups. We attributed this to the tariffs in New York which, under the Centrex service we had contracted for, required us to pay for each additional feature you wanted to have for each station. Because these costs were passed on to our users, they tended not to be ordered. This review gave us a very good indication of the combination of features that would be required to, at minimum, emulate what some departments had now.

- The other tool were several lists of station configurations our vendor was able to gather for us from other schools, university's and institutions where they had their product installed at. This helped us to not reinvent the wheel in its entirety if other organizations had already developed standard Feature Packages that worked for them.

Combining these two tools made the development of the Feature Packages much easier than we would have thought it would have been.

There were two feature items that made the development of the feature package decision process a little bit more difficult than it would have been otherwise; data communications capability and voice mail, a voice messaging/processing system. Each of these features, to be correctly and effectively implemented, required the use of a feature button on each of the feature packages these options were to be used on. Furthermore, our charging schedule included additional rates for these particular features while most others came as part of your base package.

We eventually ended up with a total of 17 Feature Packages from which the user community had to choose. This included a single feature package that was used exclusively in the student dorms. Each of the feature packages was given a Feature Package number corresponding to the station type the package was on and, a short description of the available features. To help make the selection process a little easier for the user, we published a Newsletter with the 17 Feature Packages listed in it. Each Feature package was pictured as it would appear on the station.

There were two critical capabilities of our switch that allowed us to design and introduce the feature packages in this way. The first is the ability of the switch to allow a station to access system and station features that do not appear directly on the station as a feature button. By using the "Flash" or "#" or "*" keys on the stations, other features could be accessed and implemented. What this meant for us is that even if a user did not have the feature capability appearing on their station, they could still have use of that feature. The second item was the capability to add features to entire Feature Packages with some simple commands on the switch. For example, if we wanted to add the capability for students to have the Conference feature, we would just add that feature capability to their feature package table and all students would then have that feature.

With these two capabilities, we planned on adding additional features over time to the University as we become more verse in the System's use and the use of the new stations. We were planning over time to do something like "The Feature Of The Month" to introduce these new or expanded capabilities. This method was widely accepted by the administration.

CTS RolmPhone Feature Packages

This is a revised list of all Columbia Telecommunications System (CTS) Feature Packages. These features can only be used with RolmPhone stations and are listed by RolmPhone model.

A. For Administrative Users

RolmPhone 120

Feature Package 120-1 Standard	Feature Package 120-2 Data*	Feature Package 120-3 PhoneMail*	Feature Package 120-4 Data*/PhoneMail*
Sta Speed Vol <&>	Data* Vol <&>	Msg Wtg Vol <&>	MsgWtg Vol <&>
Fwd	Fwd	Fwd	Fwd
Save/Repeat	Save/Repeat	Save/Repeat	Data*
Camp	Camp	Camp	Camp
Pick	Pick	Pick	Pick
Flash	Flash	Flash	Flash
Line	Line	Line	Line
Hold Connect Transfer	Hold Connect Transfer	Hold Connect Transfer	Hold Connect Transfer

Feature Package 120-6
Data Only
No Handset

RolmPhone 240

Feature Package 240-1 Standard 10 Line			Feature Package 240-2 Data*			Feature Package 240-3 PhoneMail*			Feature Package 240-4 Data*/PhoneMail*		
Intc	Flash	Pick	Data*	Flash	Pick	MsgWtg	Flash	Pick	MsgWtg	Flash	Pick
Line 10	Fwd	Park	Intc	Fwd	Park	Intc	Camp	Park	Data*	Camp	Park
Line 9	Save/Rpt	Camp	Line 9	Save/Rpt	Camp	Line 9	Save/Rpt	Fwd	Intc	Save/Rp	Fwd
Line 8	Speaker	Mute	Line 8	Speaker	Mute	Line 8	Speaker	Mute	Line 8	Speaker	Mute
Line 7	Vol <&>		Line 7	Vol <&>		Line 7	Vol <&>		Line 7	Vol <&>	
Line 6			Line 6			Line 6			Line 6		
Line 5			Line 5			Line 5			Line 5		
Line 4			Line 4			Line 4			Line 4		
Line 3			Line 3			Line 3			Line 3		
Line 2			Line 2			Line 2			Line 2		
Line 1			Line 1			Line 1			Line 1		
Connect	Transfer	Hold	Hold	Connect	Transfer	Hold	Connect	Transfer	Hold	Connect	Transfer

Feature Package 240-5 4 Line/Rep/Data*/PhoneMail*			Feature Package 240-6 4 Line/Rep/PhoneMail*			Feature Package 240-7 Standard 4 Line/Rep		
MsgWtg	Flash	Pick	MsgWtg	Flash	Pick	Intc	Save/Rpt	Rep 3
Data*	Conf	Park	Fwd	Conf	Park	Line 5	Rep 1	Rep 4
Intc	Save/Rpt	Camp	Intc	Save/Rpt	Camp	Pick	Rep 2	Rep 5
Line 5	Speaker	Fwd	Line 5	Speaker	Mute	Park	Speaker	Mute
Rep 3	Vol <&>		Rep 3	Vol <&>		Camp	Vol <&>	
Rep 2			Rep 2			Conf		
Rep 1			Rep 1			Flash		
Line 4			Line 4			Line 4		
Line 3			Line 3			Line 3		
Line 2			Line 2			Line 2		
Line 1			Line 1			Line 1		
Hold Connect Transfer			Hold Connect Transfer			Hold Connect Transfer		

RolmPhone 400

Feature Package 400-1
27 Line/Intc

Line 9	Line 10	Line 15	Line 20	Line 25
Line 8	Line 11	Line 16	Line 21	Line 26
Line 7	Line 12	Line 17	Line 22	Line 27
Line 6	Line 13	Line 18	Line 23	Intc
Line 5	Line 14	Line 19	Line 24	Line 28
Line 4			Park	Vol >
Line 3			Camp	Vol <
Line 2			Conf	Speaker
Line 1			Flash	Mute
	Hold	Connect	Transfer	

Feature Package 400-2
14 Line/Rep/PhoneMail*

Line 9	Line 10	Rep 1	Rep 6	Msg Wtg
Line 8	Line 11	Rep 2	Rep 7	Fwd
Line 7	Line 12	Rep 3	Rep 8	Save/Rpt
Line 6	Line 13	Rep 4	Rep 9	Intc
Line 5	Line 14	Rep 5	StaSpd	Line 15
Line 4			Park	Vol >
Line 3			Camp	Vol <
Line 2			Conf	Speaker
Line 1			Flash	Mute
	Hold	Connect	Transfer	

Feature Package 400-3
10 Line/PhoneMail*/Data*

Data*	Line 9	Rep 4	Rep 9	MsgWtg
Line 8	Line 10	Rep 5	Rep 10	Fwd
Line 7	Rep1	Rep 6	Rep 11	Save/Rpt
Line 6	Rep 2	Rep 7	Rep 12	Intc
Line 5	Rep 3	Rep 8	Sta Spd	Line 11
Line 4			Park	Vol >
Line 3			Camp	Vol <
Line 2			Conf	Speaker
Line 1			Flash	Mute
	Hold	Connect	Transfer	

Feature Package 400-4
19 Line/Rep/PhoneMail*

Line 9	Line 10	Line 19	Rep 4	MsgWtg
Line 8	Line 11	Line 18	Rep 3	Fwd
Line 7	Line 12	Line 17	Rep 2	Save/Rpt
Line 6	Line 13	Line 16	Rep 1	Intc
Line 5	Line 14	Line 15	StaSpd	Line 20
Line 4			Park	Vol >
Line 3			Camp	Vol <
Line 2			Conf	Speaker
Line 1			Flash	Mute
	Hold	Connect	Transfer	

B. For Dormitory Users

RolmPhone120

Feature Package 120-5
Standard

Hold	PhoneMail*
Connect	-Message Waiting
Transfer	(Comes with PhoneMail)
Flash	Data*
Camp	
Fwd	

Notes: For ALL Feature Packages, an "*" designates a service feature that is optional and entails an extra cost. Also, the feature lists have been arranged to approximate their appearance on the RolmPhone faceplates.

FEATURE PACKAGE #1

HOLD

INTERCOM ●	FLASH ●	● PICK
LINE 10 ●	FWD ●	● PARK
LINE 9 ●	SAVE/REPEAT ●	● CAMP
LINE 8 ●	SPKR ●	● MUTE

LINE 7 ●   ▲ ▼

LINE 6 ●

LINE 5 ●

LINE 4 ●

LINE 3 ●

LINE 2 ●

LINE 1 ●

1	ABC 2	DEF 3
GHI 4	JKL 5	MNO 6
PRS 7	TUV 8	WXY 9
*	OPER 0	#

● CALL WTG

HOLD   CONNECT   TRANSFER

What did we gain by establishing these Feature Packages?

- A level of standardization where feature buttons appear for the most part at the same location for the same feature on the faceplates. This makes it easier for others to use stations when not in their immediate office and allowed for a much easier and standard training session. Allowing for a standardization for training can not be underestimated.

- By requiring the user community to select from a set of preselected feature packages, we must have saved months of design work. If each department was left to its own devises, the training of the University on the new system would have been impossible and the design stage of the installation would never have been over. Every station would have behaved differently than another.

- We did not raise the level of expectations for the new system higher than we could reasonably support. Although there was much more we could have done, we could not have supported more than we were already offering.

- A boring but technically critical part of the installation is the actual loading of the telecommunications switch with all the necessary data. Forcing a standardization with the feature packages lends itself to an easier and more accurate original loading of the switch and its associated attached processors.

We realized how lucky we were and how right the decision was to develop the Feature Package was after we started to use the Feature Packages. Even with the establishment of these packages, design and training of the departments was long, hard, cumbersome and agonizing. Our only savior was the thought of having to have done it without the Feature Packages.

If you do not plan on establishing some base feature packages for your organization, you are asking for more trouble than you bargained for.

Some things to watch out for when placing together your Feature packages:

- Some station and system features may be mutually exclusive. For example, if you want your voice messaging system to answer your station when it does not answer after "X" rings, placing your extension in a hunt group may not work the way you want it. You require the aid of a very good technical designer from your vendor during this process to make sure you do not combine features that will not work the way you expect them to.

- You may have switch parameters that you can not exceed, even if you have users that want a particular type of feature. Station speed dialing, for example, may be stored in the switch and not the station. There may be a finite number of speed numbers the switch can store that may be less then the total number of speed numbers to be dialed by your users. Again, you require the aid of a very good and technically competent designer from your vendor.

- Feature packages can be designed independently of the users "Class of Service". Whether or a not a user can call just locally or requires the use of an authorization code to get off the campus, the feature packages can be designed independently of these constraints. You should not confuse the two issues.

- Do not try to be all things to all people. If you try to satisfy 100% of the user design issues, you will never have a standard set of Feature Packages.

CLASS OF SERVICE:

You probably already have a working Class of Service (COS) or calling restriction system for your current telecommunications system. My definition of a COS is, that calling area restriction that is part of a particular line or extension. We already had a COS or line restriction system in place prior to the installation of the new Telecommunications System. The restrictions ranged from being able to make calls from one campus phone to another, to being able to make calls anywhere in the world. These restrictions were enforced by switch programming/parameter settings.

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26-Sep-88                        COLUMBIA UNIVERSITY
                    OFFICE OF TELECOMMUNICATIONS OPERATIONS, SERVICE AND DESIGN
                                CLASS OF SERVICE SCHEDULE
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	ACB	APV	AWK	CFE	CF1	CMP	COF	CSF	DCP	DND	DTS	EOV	FRA	INT	NAC	NFL	NOH	PRV	SAV	SPD	SSO	SYC	TRM	TRQ	TTT	UNAV	VDC
10 STUDENT FAC-DATA		xx		xx	xx																						
11 STUDENT FAC-NO DATA		xx		xx	xx																						
17 REST/FAC 92, 94, 95, 97																											
18 SHAPIRO/KEW HALL		xx		xx	xx																						
20 FULL REST/NO FAC DATA		xx		xx	xx	xx		xx																			xx
21 FULL REST/NO FAC		xx		xx	xx	xx		xx																			xx
22 CENTREX TIES														xx													
25 REST NO FAC DATA		xx		xx	xx	xx		xx																			xx
26 REST NO FAC		xx		xx	xx	xx		xx																			xx
30 FULL REST FAC DATA		xx		xx	xx	xx		xx										xx	xx					xx			xx
31 FULL REST FAC		xx		xx	xx	xx		xx										xx	xx					xx			xx
34 REST FAC DATA		xx		xx	xx	xx		xx										xx	xx					xx			xx
35 REST FAC		xx		xx	xx	xx		xx										xx	xx					xx			xx
38 SEMI REST FAC-DATA		xx		xx	xx	xx		xx										xx	xx					xx			xx
39 SEMI REST FAC		xx		xx	xx	xx		xx										xx	xx					xx			xx
42 UNREST FAC/DATA		xx		xx	xx	xx		xx										xx	xx					xx			xx
43 UNREST FAC		xx		xx	xx	xx		xx										xx	xx					xx			xx
48 SEMI RESTRICT/NO FAC/DATA		xx		xx	xx			xx										xx	xx					xx			xx
49 SEMI RESTRICT/NO FAC		xx		xx	xx			xx															xx				xx
54 UNREST/NO FAC/DATA		xx	xx	xx	xx			xx										xx	xx					xx			xx
55 UNREST/NO FAC		xx	xx	xx	xx			xx										xx	xx					xx			xx
56 FAX MACHINE															xx	xx	xx										
57 CONTROL GROUPS		xx	xx	xx	xx	xx	xx	xx							xx			xx	xx					xx			xx
63 SWITCHROOM	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx			xx				xx	xx			xx	xx	xx			xx
	ACB	APV	AWK	CFE	CF1	CMP	COF	CSF	DCP	DND	DTS	EOV	FRA	INT	NAC	NFL	NOH	PRV	SAV	SPD	SSO	SYC	TRM	TRQ	TTT	UNAV	VDC

ACB – Automatic Camp-On Busy
APV – Always in Privacy
AWK – ACD Automatic Work on Hang-Up
CFE – Call Forward (External)
CF1 – Call Forward (Internal)
CMP – Camp-On Busy
COF – Conference Call Add-On
CSF – Control of Station Features
DCP – Direct Call Pick-Up

DND – Do Not Disturb
DTS – Direct Trunk Select
EOV – Executive Override
FRA – Forced Route Advance
INT – Intercept TimeOut
NAC – No Authorization Code
NFL – No Flash Allowed
NOH – No Howler Offhook
PRV – Private Call

SAV – Save-Repeat Number Dialed
SPD – Station Speed Call
SSO – System Speed Override
SYC – System Speed Call
TRM – Terminating Station (Dict., Rec.)
TRQ – Trunk Queuing
TTT – Trunk-to-Trunk
UNAV – ACD Unavailable Allowed
VDC – Voice Dial Code

However, the new system raised a new set of capabilities and issues that needed to be addressed. We could now use authorization codes on stations all around the campus, voice and data restrictions could be different on the same station, authorization codes could be used to raise the COS of a line to different levels of calling privileges, tie lines could either be included or excluded from various COS's.

Devising a COS schedule does not necessarily have to be difficult. Once you understand the different options and have made the policy decisions as to what will be allowed and what will be restricted, the COS schedule will follow a natural progression. Our COS schedule is included here as an example of one way it can be implemented.

SWITCH SYSTEM PARAMETERS:

Your switching system will have dozens of parameters that can be user defined. These will range from such things as how long will a station be allowed to be off hook before it is cut off from service to how the operators can access different features of the system. We literally had dozens of pages of system parameters that we could assign to various settings. Most of these parameters were very difficult to determine prior to the system being up and running for a while, they really required some system experience prior to making an intelligent choice.

We reviewed the system parameters and did make some specific changes to the default settings. However, for the most part, we installed the system with most of the default settings in place and decided to revisit them when the system had been running under a normal load for a while. There were very few settings that actually changed when we reviewed them the second time around.

One item you may want to check during this phase of the installation is the availability and the number of master/control consoles that can be connected to your system at one time. Although I agree that only one set of people can be responsible for the management of the switch at any given time, it will be very helpful to you and your staff if you could have read only type privileges to your systems master console. This type of capability will come in handy on many occasions.

HOW MANY JACKS:

During the RFP preparation process we calculated the number of Centrex extensions on the campus by using some of the available data bases. One of the purposes of this count was to help determine the number of new jacks (station outlets) for the vendors to install and bid on. After calculating the total number of Centrex extensions presently installed we added an additional 30% to that base figure for future growth purposes. These figures were basically determined by building and not by department or school. We thought that the issue of how many base jacks we were installing and then calculating the growth jacks above the base would be a relatively simple matter. We could not have been further from the truth. What did we miss?

- The records we had were comprised of the bills from our local Telco and the data base our Centrex billing vendor maintained for billing purposes. The basic approach we took in 1985 was to count the number of Centrex lines and equate them to the base number of jacks we would need. A major miscalculation was not really considering the bridged hardware lines that would have increased the number of total base jacks really needed. With some hindsight it is easy to see we could have only made a guess at the total number of base jacks needed since our records would not have been of significant help.

The omission of the bridged hardware lines gets compounded when you consider that a digital telecommunications system can only do a software bridge and not an actual hardware wired bridge. This is a natural characteristic of the digital medium. The one item that helped save us from ourselves from this omission were the dorms. For the most part, the dorms have a one to one relationship of phones to jacks, hence, the added 30% applied to their counts helped to cover for the omission made on other hardware bridges on the campus. We ended up on the whole in balance. But don't you make the same omission.

- After we selected our vendor and were in the actual cable installation phases of the Project, actual base jack counts were initiated. This was accomplished by using the departmental Telecommunications Coordinators. We thought we had given our Telecommunication Coordinators (TC's) fairly straight forward and accurate instructions for counting their currently installed and used Centrex base jacks for planning the new cable plant installation.

The primary instruction was to locate any and all equipment connected to a Centrex line, count that jack as one to be included as part of the base installation and note its' location on a floor plan provided by our office. We reminded the TC's that the actual installation would take over a year and if they expected the jack location to move or it was in the wrong place to begin with, mark it in the correct location for the new one to be installed. Then, when you have identified all the currently installed base jacks, add 30% to that figure and that is the number of growth jacks you can identify on the floor plans for growth. Seems to make sense, right? We ran into three primary problems you may want to keep in mind.

1. The data we were working with was at least one and half years old. Many more lines had been installed since we did our last calculations for the RFP. This was a problem, but not an insurmountable one. If you had a phone now, we assumed that you would need a phone later and hence the jacks would be used anyway.

2. We did not know how many illegal bridges there were nor the loose interpretation that the TC's would take from our instructions. For example, if a user had installed an answering machine to their phone with some special adapter, they considered that an additional jack. We only counted it as one jack location.

3. We had hundreds of dedicated data lines on our switched data network that was to be replaced by our new switch. Although we had reminded the TC's that if a phone was not in close proximity of the data terminal, they should add another jack to that location for the data devises use, many of them did not do this. We learned later that the instructions for data use were not well understood by most users. The next time I would pay much more attention to this detail.

- We had included hundreds of jacks to be installed in centrally scheduled classrooms. These were classrooms that were booked and scheduled by the Registrars Office. What we did not count on were the many privately scheduled classrooms considered to be owned and run by individual schools and or departments. There were many discussion on this issue with the many schools that insisted that they should be part of the central pool of jacks for classroom purposes. However, since they were not in the original budget, they lost their arguments. If they wanted these classrooms wired, they either had to use their 30% or pay the extra jack charge that we developed with our vendor. This is one item I wish I had when making the original plans for the jack counts and installations. All of these privately run classrooms really should have been wired, but were not.

- Our original records did not differentiate between wall mounted phones and desk mounted phones. Over 10% of our phones were wall mounted. This was a surprisingly high figure and ended up hitting us with a big add on cost at the end of the Project. The cost of wall mounts are much more expensive then just a plain wall jack with a desk top station.

- The jack design stage preceded the station design by many months. We had the two designs (jack locations/station design) done separately because we know we had to get the cabling part of the Project started well before we did anything else. Although this proved to cause other problems, it was the right decision. We discovered all too late a number of departments that did not replace a number of Centrex lines that they asked to have jacks installed for with new stations from the new System. There is nothing terribly wrong with this. The departments were well within their rights not to replace everything on a one to one basis. However, their decisions to not replace stations did take us by surprise and throw off our jack growth counts.

VOICE MAIL DESIGN:

Very early on I was convinced that voice messaging/processing would change the way the University did business. I believe this to be true for almost any business organization. I even had the opportunity to discuss my views on voice mail on the nationally syndicated TV show "Business World" aired on ABC. The way I describe voice messaging to my colleges is as follows, "non-simultaneous, interactive information exchange." Even before we signed the contract with our vendor I had been given a guest mailbox by our representative on their voice mail system. I immediately got hooked and saw the great potential of its use not only in an educational/research environment, but almost any business setting.

As discussed earlier, Columbia was to have one of the countries largest co-located voice mail systems ever installed. Because of my personal interest in the voice mail system and plans for its success, I took an extra step. There were two primary technical vendor guides that provided instructions on how to install and administer the voice mail system, I read both guides cover to cover, twice. For quite some time I believe that I knew more about our vendor's voice mail system than most of their Technicians, Engineers and Designers assigned to our campus. Not that they were not trained or educated on their voice mail system, they just had not recently detailed the manuals as I had just done. My personal knowledge ended up being a great aid to the University and our vendor in the installation, design and implementation of the system. As I have noted through out this book, it is to your benefit to try and know as much as your vendor does about the products they are installing. The voice mail system is no exception to this rule.

It was very difficult for us to come up with a specifically engineered voice mail design. There was very little to go on concerning voice messaging or about the use of answering machines on the campus. Further, our vendor really did not have any good statistics about voice mail experiences on other campuses. We decided to take two new and innovative steps in providing voice mail services:

- One was to provide every student, faculty, researcher and administrator on the campus that desired a voice mail box to have a basic service package. At the time, we knew of no other institution that provided voice mail to all phone users of its system on a campus wide scale.

-Two, in order to keep hardware requirements in check till we had some experience, we provided relatively conservative service options. These service options are outlined below. With not very much scientific reasoning we provided the following voice mail packages:

BASIC STUDENT/DORM VOICE MAIL SERVICE:

- 3 messages per student per room, i.e., if there were three students in a room they would get 9 messages (3 messages per student times 3 students).

- Station Call Forwarding only. This is when you Forward your calls from your station by placing your phone into a call forward condition manually. We did not offer System Call Forwarding, i.e., Call Forwarding automatically on No Answer or Busy. This was decided upon after discussions with the Student Council Subcommittee on Telecommunications. The Council

decided that allowing the students to decide when they wanted calls to go to voice mail was better then having the calls go automatically. Also, this process would help conserve voice mail trunk utilization.

- One personal greeting was allowed per room, per mailbox. The students shared the one personal greeting. This would help conserve disk storage space.

- No distribution List Capability. This would help conserve CPU utilization and overall use.

We initially set up about 3,900 mailboxes as noted above. Students could purchase additional messages for their mailboxes at the following rates: 8 messages instead of 3 at $15 a semester or 15 messages at $25 a semester. We were very surprised to find that the first semester these options were made available, over 1,000 students opted for larger voice mail boxes.

BASIC FACULTY/ADMINISTRATION PHONEMAIL SERVICE:

- 4 messages per station. This is unlike the 3-per-student in a shared room. The 4-per-station assumed a dedicated line per individual.

- Station Call Forwarding, same as above.

- System Call Forwarding, i.e. forward on No Answer/Busy. This was installed on request only and was automatically available on the upgraded voice mail boxes.

- One personal greeting per station, same as above.

- No distribution List Capability, same as above.

Basic Administration service was initially installed for about 3,000 stations. Basic Administration Service could also be increased as follows: 10 messages was $5 per month and 25 messages was $10 per month. In addition, if you requested a larger mail box you also received 3 personal greetings and a Distribution List of up to 5 groups.

As much as I had anticipated voice mail's use and popularity on the campus, its demand was far greater then I had ever expected. Not everyone loved it, but enough people did and understood its use to make it the most popular advanced feature we made available. Before the system was several months in use, we were planning on its expansion.

Not all voice messaging systems are the same, some have more features than others and some can expand to handle very large community's of interest while many can not. Here are a few items and thoughts to keep in mind when setting up your system, regardless of the size and complexity.

- Profiles. Each of the over 7,000 profiles for our users had to be data entered individually. Even though all our student profiles were the same, they still had to be data entered one at a time. This takes a lot of time and subjects your voice messaging system to lots of other technical and implementation issues. Check with your vendor about original data entry and who is responsible for the work. How do you check or verify the data entered? Does each Profile require data to be entered into your switch as well? While data is being entered, can you use the voice mail system?

- Passwords. Password data entry for the initialization of or voice mail system was not a great problem, we just used the default password. However, there are two problems, one concerns implementation and the other with going service of the system.

Since the password was the same for all initialized mailboxes, we did experience some problems with persons illegally accessing mailboxes prior to the owners getting into them and changing the passwords themselves. Although this was a problem, it did not prove to be as big as we might have thought it would be.

The second problem has a much larger implication. We needed to change the passwords at least twice a year for 3,900 student profiles, all the student dorm phones, as residences change at least twice a year. Since our system had no global change password back to default by group, this had

to be done manually for each profile. The more group initiated changes your voice mail system allows, the easier the administration of the system will be. This is especially true for very large systems such as those installed in universities.

- Guest/Direct Access Numbers. Our voice mail system had a nodal architecture. Each node was really a stand-alone system. To make the separate nodes look like one large system, they were networked together to allow messages to be transferred between them without the user needing to have any knowledge of where the destination mail box was. The sender just needed to know the unique mail box number of the destination mail box. This number was generally the same number as the extension on the phone you were sending the message to.

However, getting access to the voice mail box directly or allowing callers to have guest access to your direct mailbox without calling your station's DID number first required at least 2 sets of DID numbers for each node. In our case, the system was designed for 10 nodes and had 20 DID numbers that were used in conjunction with the system. This was the architectural design of the system, so there was little choice. This probably all sounds very confusing. However, you need to take a considerable amount of time to decide exactly how you are going to implement your voice mail system and disseminate node information if that is how it was designed. Not all voice mail systems work this way and may not have the same set issues.

Distributing voice mail system information can be a major task if your system does not allow for the easy manipulation of data base files that contain all the information a particular user will need for accessing their voice mail box. Our system did not have this capability. Distributing the voice mail data (what node you were on and the correct numbers to call for access) was done in a manner that very few were happy with, including our vendor. After making several false starts with posting data in individual buildings, we ended up having staff and students calling a special number and had one of our Project staff look up the data for each caller individually. I hope future implementations of large voice mail systems will take into account the necessary management of these very useful and unique systems. **Vendors must place more attention to these details.**

- Testing your voice messaging system. Make sure your vendor tests all the permutations of the system prior to allowing it to be go on-line with your user community. You need to make sure that not only the system networking (this definition will change from vendor to vendor) is in order, but that actual messages are able to be sent from one node or part of the system to another. The network may seem to work but the messages may not be getting through. The same is true for testing out your Broadcast capability if you have one (Broadcast capability, sending out a message that is automatically forwarded to each voice mail box on the system). Keep this one in your Procedure Book, since your voice messaging system is directly connected to your switch, each time a change is made to your switch for any reason, recheck and verify that your voice messaging system is working as designed. Sounds simple? Watch out for it.

- Sensitize your vendor as to how you have allocated messages. For example, if you have allotted 3 messages per student as we did and your vendor sends out two test Broadcast messages one after the other, they have just used up 2/3 of your student's box. Be sure that your students will not appreciate it.

- There are two main limiting factors in the usage of a voice mail system; disk storage and access/trunk blockage. These two resources must be carefully managed for the system to be successful. Generally your vendor will have quoted you a system based upon a certain set of estimates based upon the number of users and the number and length of messages to be left on the system. These assumptions

need to be continuously checked as the system starts to be used. If either one of these resources are allowed to get out of hand, the system may degrade to the extent that it is no longer useful for the intended purposes.

A voice messaging system can be one of the greatest productivity purchases your organization can make. However, like any other business tool, it must be carefully planned for and managed in order to realize the productivity possibilities.

STATION MESSAGE DETAIL RECORDING - SMDR
(a special design consideration):

For years, the standard design for the recording of station message detail recorded data has been a single tape drive connected to the switching system. Our vendor's provided method of recording SMDR was no different. However, this was not an acceptable method of recording one of the most vital statistics the switch generates, at least not to me. I had asked our selected vendor about simultaneous methods of recording SMDR on multiple devices well before we even signed our contract. According to our vendor, they had no supportable system to record SMDR data in a simultaneous manner on at least two different devices.

Why do I make such a point on this issue? In my circumstances, I was running a Telecommunications Department that received no funds from our organization other then what we were able to bill out for usage and equipment. The lose of any billable SMDR would be considered a major financial problem. My experience with tape drives and their use as a storage device coming from the MIS side of the business, is considerable. Tape drives are electro-mechanical devices with a considerable number of moving parts, they are subject to failure. Further, the medium they store data on magnetic tapes, are also subject to failure for a variety of reasons. My fear was that there would be a failure of the tape drive and that SMDR data would be lost prior to the failure's detection.

The problem with these potential failures of a single source of SMDR collection devices is that once the data is lost, it is lost forever. In our case, this was not an acceptable risk. I suspect that most of you are in the same, or similar, position.

Because of our continued persistence, we finally devised a method of storing SMDR from the switch to multiple devices simultaneously. The solution turned out to be relatively simple. We hooked up several PS/2 systems configured with high capacity disk drives running an SMDR collecting software program. The PS/2 systems were connected to the SMDR list port on our system with a Y RS232 type cable. This allowed each PS/2 system to collect at the same time all the SMDR data coming off of the switch. If we had a failure of any of the PS/2 systems collecting the SMDR, the remaining systems continue to collect the data off the switch. In this way we were assured of continuous SMDR collection.

It is very important that you work out with your vendor a design for the collection of SMDR that both satisfies your need for the data and is supported by your vendor. You may have to encourage your vendor to look at the collection of SMDR from your point of view. If you are successful, the effort will be worth it.

There are several other issues that you will want to know about concerning the recording of SMDR data:
- Does your switch have a time limit for recording calls? After a certain number of hours of connect time for a call, does the SMDR recorder start over and lose the first period of time? This issue is important for data calls that may extend over many hours and time periods.

- When you shut down your system for whatever reasons, do you lose SMDR that was stored in the switch?

- When starting up your system, does the switch send out a certain message to the SMDR recorder that may cause a problem?

- Can you select what SMDR data your switch will generate? Can you ask for tie line data but not other trunk data?

There amy not be a lot you can do about what SMDR records can and can not be recorded, but you are better off knowing what they are then not.

OTHER ITEMS OF INTEREST:

I CAN HEAR YOU!:

One day after the we started installing the stations I received a panicking call from one of the higher ups on the campus. I was informed that there was a critical breach of security in the design of the entire telecommunications system. This caller had gone as far as confirming their determination that there was something wrong with the system by calling a consultant they knew.

The problem: when one station addressed another through the use of the intercom feature, if the party being reached did not respond to the intercom call, the person placing the call could hear all that was being said in the room of the station that was called. I responded with, "Oh, you mean the hands-free intercom feature." My complaining caller was not amused. After much discussion the caller was educated in the two ways that an intercom call could be placed, one being hands free not requiring the called party to lift the hand set and the second that does require the caller to actively pick up the hand set and answer the phone. Since the issue was raised at such a high level in the University, I wrote an article on the use of the intercom system in our TeleCommunity Newsletter.

I think this short story demonstrates the small nuances of your new telecommunications System that need to be paid attention to. I never would have guessed that the hands free intercom feature would be cause for alarm.

NOT THERE, HERE!:

One of those items I would like to have back was the process we used to allow TC's to make changes to their jack and station installation designs. I do not believe that there was one building or department where the jacks were being installed that the installation crews were not asked, "could you just move this one jack to the other side of the office?" Or, "while you are here could you please add one more jack over there?" As a matter of fact, the worst offender of this problem were members of my own department, the Computer Center. I guess we should not have been so surprised at the number requests that were made on the fly. But we were.

It became very obvious to us that the TC's who we asked to make sure that they conferred with their departments on these issues during the design stages did not. If I had to do it over again, I would institute a surcharge for requests made in the field and honored. I do not know if this would have cut down on the problems, but it would have at least provided an incentive for the TC's to get more input then many of them did from their departments. It would have also helped assure us of a paper trail for the changes done. We had to follow up on many of these field changes later by actual site visits. A very time consuming, and expensive, way of doing business.

Everyone is busy. Your TC's are very likely the same staff that take care of departmental budgets or handle registration and have a thousand other demands made upon them on a regular basis. Everyone of them will have a certain amount of sympathy for you and the Project but little time to help or cooperate to the level of getting the job right the first time, on time.

My general philosophy is that there is never really a good time to ask for anything, hence, you must set dates for when materials are due and stick to them. To do this you must have the support of your vendor and that of your administration. Without both, although you will set deadlines, they will not be heeded. With such a large Project as the installation of a Telecommunications System, if you try and accommodate all your users time constraints, you'll never get your job accomplished.

I can not recommend any specific incentives for this cooperation. I can tell you that personal follow up calls go a long way in getting many who would have otherwise ignored you to at least tell you how late they will be with their material. I spent a considerable amount of time on the phone myself and I am convinced that, without that investment of my personal time, we would still be waiting for design information and access to buildings.

A tactical mistake we made was to ask for the staff's social security number during the initial station design stages. There was a very good and valid reason for our requesting this piece of information. We were going to use the social security number to match our Project files against the University Personnel Information System. This was to verify the spelling of names, titles and departments for our telecommunication: data base. It seemed reasonable at the time.

I did not believe that the request for Social Security numbers was an invasion of the staff privacy. The uproar that this caused was remarkable. Even though we already used the Social Security number as the employee ID, it was unacceptable to ask for it as a unique point of reference in the Project. The uproar and level of cooperation was such that we finally had to drop the request entirely.

Design issues are one set of problems that will continue to change as you do more and more with your telecommunications system. Your system will evolve and so will your designs for its use. This is one area where change will be constant.

Chapter 7.

SWITCH ROOM

The location, design, building/construction/renovation and general overall management of your switch room implementation are going to be a great pain, even if you plan on using existing space. Unfortunately, this is also an area that will require your constant diligence and oversight. There are many forces at work in getting a switch room to its final acceptance stages. However, the forces at work to get the switch room completed are not always working in harmony.

We really did not have dedicated staff whose primary responsibility it was to get the switch room ready for the switch installation. The general responsibility fell to our Facilities Management Project Manager and persistent oversight by myself and some of my staff. We were very fortunate in that our Facilities Project Manager was very dedicated and diligent in his follow up and checking with the construction crews and engineers. Even with this amount of supervision, it was not enough to get things done the way we really wanted them, at least not the first time.

LOCATION:

If you are one of the lucky ones, you already have lots of available space and many areas to choose from for the location of your switch room. However, even if you do have sufficient space, you have likely not included all of the items below in your total space needs. If you have limited space to choose from, then attention to these items is even more important for your selection process.

Good access. You must make allowance for the delivery of relatively large pieces of equipment. Not only your PBX but the MDF frames and associated cable reels, boxes and materials that will accompany it. This includes the existence of elevators large enough and with the ability to carry the stated weights, which will be considerable, halls and corners wide enough that allow for clearance, doors that are not only high but wide enough and good access to the street from which deliveries are made. Do not be fooled into thinking that these are all one time issues, you will be needing deliveries and equipment for many years to come.

Security. While providing good access, you must also be sure that the location can be secured. How many doors are there that lead into the space, are the walls and doors of the proper fire resistance rating or will you need to upgrade them to the proper fire rated material, are the walls solid or easily broken into, can the main entry ways be monitored or are they in hidden areas of the campus? Better too think of these things now before it is to late or cost more to accommodate. Theft and vandalism are a problem around the country, not just in New York.

Size. How much space will your currently designed switch and attached processors take? This calculation is only the beginning, make sure you take into consideration such space size factors as;

- Anticipated growth of the switch itself. You will likely guess wrong, but guess anyway. With voice needs growing and data, video and voice mail becoming ever more popular items to have on switches, you may need twice the space in five years or less.

- What peripheral equipment such as voice processing/messaging systems, data communications equipment, Call Detail Recording equipment, video and security devices will go into the room?

- Where will your cable vault (the place were all your plant feeder cables terminate and get spliced to your cables running to the MDF) be located? Make sure it is large enough to be worked in and remember to allow some growth for future installations. How will your switch cables go from the cable vault to the switch room? Your vendor may tell you he needs so many square feet of openings in the floor or ceiling to allow the switch cables to cross from the switch room to the cable vault. You should consider adding additional openings for this purpose, otherwise you may find yourself in the position of cutting additional openings in your floors or ceilings when your switch is installed and operating. You will not appreciate the flurry of dust that this will cause.

- Where is your backup power support coming from? Batteries, generators, both? Account for the needed space now. Sealed batteries do not need the same kind of ventilation as your normal acid based batteries do, check your space accordingly.

- Where will your MDF be located? In your switch room, in an adjoining area? Make sure you leave room for its expansion.

- Plan on sufficient space for your and your vendor's technicians and space to allow the staff to grow into. Do not assume that this is all the staff you will ever need or have.

- Don't forget space for your telco staff and their equipment. They will remain very important to you and still have needs for space and equipment, especially if you go the route of T1 type circuits.

- HVAC units will also take up considerable space. Plus, you will likely have a backup unit to place in addition to your current HVAC requirements. Remember, as your system grows so does your need for more HVAC capability.

  - Don't forget things like your "Customer Service Units" (generally the demarcation point for your telecommunications systems lines and the telco trunks), alarms and their associated panels, an array of new computer devices that your staff will use in the management of the new system and, books and manuals that will line your walls.

  - Storage. Even if you think that you will have storage space available at another site, you will need some for your switch room, otherwise it will turn into a mess. Somehow boxes of switch cards and stations and documentation and frame parts and paper and..... find there way into the switch room. Leave yourself space for these things.

  - You will want to be able to keep the environment of the switch room as stable as possible. This has much to do with where the space is actually located in relationship to other areas. Often times switch rooms are located in basements because that is where large chunks of space are available. Basements flood. Water will generally seek the lowest point to settle in, basements generally fit this category. Boilers, steam and water pipes will often run through basements. Be cognizant of these things when looking at new space. They will all affect the needs for HVAC systems and water protection devices. Be careful about adjacent areas with high voltage equipment or ones that emit frequencies or emissions that may interfere with your system. Better to know before hand that the Magnetic Resonance Imaging unit next door will not be happy about your RFI emissions and the other way around.

Often times you have very little or no choice at all as to the location of your switch room. In these cases, you must plan on the above items as part of your renovations/construction project. They may add to the overall cost now, but will save much more later.

SWITCH ROOM DESIGN:

Do not attempt to design your switch room alone. Sounds obvious doesn't it? You may ask the question; who are those persons and which expertise will I need to get a switch room designed properly? I have attempted to outline these details below.

- Your vendor's engineers must be a full participant in the entire design process. This does not mean the group of marketing folks that sold the system to you. Your vendor's engineers must get actively involved to make sure that your are grounding the system to their standards, that power is installed in the manner that they require it, floor loading will support your system's weight, that the HVAC calculations you are using are correct and based upon the correct assumptions on BTU's for not only the switch but for all the other devices and staff in the room. More about HVAC later. If your vendor's engineers are happy with just giving you the system installation spec manuals and no more, you have to insist on a more active approach. A large complex installation requires site visits, floor plans and a hands on approach from your vendor. Not all specs are created equal.

- Your vendor's maintenance staff. These are the folks who will have to live with the system after your installation and engineering teams leave. Although the specs say that X feet are needed for clearance around your equipment, your maintenance team may have other ideas about that. How you place the equipment in the switch room matters. We originally had an equipment layout that would have required the maintenance crews using roller skates to get around the switch room. The maintenance team was quick to point this out while the installation team saw nothing wrong with this configuration. Your original installation team may not have been in the business of maintaining the system, get the maintenance staff's input. Do not assume that your installation team is coordinating with the staff who will eventually manage this behemoth with you later. Insist and follow up that their input is getting solicited, received and used. It is not enough for you to hear that they have contacted the maintenance team and have their input. You want to hear it yourself.

- Get the right type of engineers for the right purposes. We contracted with an engineering consulting company to help with the space design and technical specifications. They had on staff HVAC engineers, Electrical Engineers and Architects. Make sure your architect has had experience with either switch rooms or computer rooms. The design of these spaces are not the same as for office. All these specialties need to be consulted and have their assumptions and designs confirmed and checked. All these technical types have to be coordinated with each other and the engineers of your vendor. One thing I learned is that not all engineers speak the same language. Either you, or someone you trust, must check and double check what is going on with them. If they are all sitting around at a meeting shaking their heads saying yes to everything that is going on, ask one of them to ask what it is they think they have agreed upon. You will be surprised, and so will they.

- Often times, after your HVAC system is designed, installed and tested, someone calls your in-house HVAC maintenance shop and says, now that we have done all this wonderful work, we want you to maintain this new system. Your HVAC shop comes over and says "How can we maintain this mess, the design makes no sense, there is no access to any of the equipment and our staff is not trained on this type of equipment." And you thought your Engineering Department talked to your Maintenance Shops. Guess who you should have been brought into the design and installation stages of your HVAC system? This did not happen to us on our Project, but I have seen it happen time and time again on other large projects. Your in-house HVAC maintenance staff may have valuable information to offer on these issues, use them if you can. Taking this simple action will also help avoid the finger pointing later when they have maintenance problems.

- I would consult with my Security Office for their input. How you physically protect this new investment may be of paramount importance and you do not want to ignore there expertise. The placement of alarms and sensors is really a sensitive subject, so to speak, and requires the touch of the experts.

- If your campus has a Fire and Safety Officer I would try to get them involved in some of the design issues for fire protection systems. Your engineers should have a pretty good idea of how to protect a switch/computer room, but the input from the Fire and Safety Office could also prove valuable. Also, do not forget to consult with your local Fire Department. They may have jurisdiction over the fire protection and suppression system you plan to install. Better to talk to them early and request a copy of their rules and regulations now then to have to do it all over again later on.

- Are you installing a microwave system, T1 lines for DID and/or DOD service, a broadband system, fiber, inbound/outbound modem pools, video? If so, make sure you get the technical input of all these individuals as to their special space and engineering needs in the switch room prior to finishing your design. You may be surprised at the power or HVAC needs of these items.

It is often difficult to get all of the above expertise to agree as to what they need or how a particular issue should be addressed. However, their services will all have to work together in the switch room. Better to get the specs and design done correctly, or as correct as you can now, the first time, rather then try and make up for it later.

SWITCH ROOM CONSTRUCTION/RENOVATION:

First and foremost, plan on the switch room construction being delayed. The chances are that if you estimate six months it will take nine. The timing of the switch room readiness is a critical one. Such issues as:

⠿ Delivery of the switch and its peripheral equipment cannot be scheduled with any assurance until the switch room is actually ready. This includes the completion and testing of the HVAC systems and power supply. The security and fire and safety systems could be put off, but you are better of not to as you will see.

⡀ The completion of the cable plant often depends on the completion of the switch room. If your Main Distribution Frame is located in your switch room, you can not finalize the cable connections and the testing of the entire cable plant.

⡁ Your vendor will plan on bringing additional staff to your site to work in the switch room. They will be needed for the placing and constructing your switch and related equipment.

⡂ Everything else you plan on will revolve around the actual powering up of the switch. This includes user training to the actual loading of the switch of all the station design data and system parameters.

You may believe that the actual construction of the switch room will be a snap after you have spent an unbelievable amount of time with the above noted people designing every nook and cranny of the space. Wrong. This way of thinking is the fastest way I know to completely mess up what was a good idea in the design process. What looked good on paper does not always work out that way in reality. Change your mind set and get ready to work.

Dimensions will be wrong, the column will be in the wrong place and bigger then you thought, that water pipe that was going to be moved, can't, your office neighbor says that their HVAC system is dependant upon a piece of equipment that some how got installed in your space, your vendor discovers that they left out ten maintenance 120V outlets, the dedicated power for the fiber link to your Telco, and the switch room lights were not set up to be partially turned off during the night hours to save electricity. And by the way, the slope of the entrance ramp does not meet OSHA specs.

These and other items will crop up during the actual construction/renovation of the switch room. No matter how carefully you plan, you will make changes on the fly and modifications to the space even before it is finished. This is know as Construction Project Management.

You must be personally involved with this process. Even if you have assigned a very competent and dedicated Project Manager, they very likely do not know or understand telecommunications systems and the nuances of how you plan on operating your new telecommunications system. What do I mean by your personal involvement?

- Walk through the construction site every day, from the first to the last day of construction. Pick a time of day and make an appearance every day at that time. This will allow you to select a bench mark for progress and for what is going on at a particular time of day. You will be surprised at how regular the construction crews are at doing certain things at particular times of day. I would make this set appearance early in the morning when the crews are just coming in or have just started working. In addition to this set time, make several random visits during the week to check out what is going on.

- Talk to the Construction Supervisor. This is the guy who stays on the site and is directing the work of the crews. He is also the person who is usually reading and interpreting the blue prints. You'll find out a lot more of what is going on by talking to him then the Project Manager and the Construction Company owner at your weekly meetings on the progress of the switch room.

- Ask lots of questions. What are you doing, why, from what document? Don't pull your hair out when you get the answers to these questions. Often the guys doing the work say things like, "the engineer does not know what he is talking about, if I do it his way it will not work". Question the engineer and follow up that the work is actually getting done the way you will need it to operate for your purposes and not those of someone else.

- Go back to the specs often. Try to become somewhat familiar with the blue prints so you can ask intelligent questions. You're less likely to get the wool pulled over your eyes, either by accident or neglect. Some blue prints are easier to understand then others. You need to know enough to ask questions without necessarily understanding the detailed engineering answer, but it helps. When all else fails, ask simple. some times stupid questions, it can not hurt.

- Ask about delivery dates of equipment and supplies. When is the HVAC system going to arrive, the piping, the steam fitters, the dry wall, the light fixtures, the door bucks, the locks for the doors, the plate glass for the windows, the raised floor, the power panels that have been specifically designed for you, the duct work and tin knockers? Keep asking until these things arrive as you think the schedule calls for them. If things are delayed you want to be one of the first to know. Construction is very much done in order, if one thing is delayed, many other items often have to wait to get done and there is just no way to hurry them up.

- Keep an eye on the time of year that it is. If you have outside work to get done, i.e., for the HVAC system or a motor generator to be installed on a slab of cement that will not cure in the cold, you want to know about it. Getting heavy equipment hoisted in the dead of winter on icy and cold roofs is not the time and place for this type of work. Delays due to weather are tough to beat and make up. During bad weather you are bound to have more staff out because of illness, this includes your contractors staff. This also can hold up progress.

● If you are like me you are a professional manager, not an engineer. However, you can check things as a manager that may lead to potential problems that require an engineer to fix or design. I always look for the quality of the work being done. By questioning the quality you open up other areas of concern.

Do not confuse the above by you trying to replace your Project Manager as the person who is responsible for getting the switch room completed correctly, on time and on budget. Part of your job is to keep those responsible for the project responsive to your needs and concerns and to get the job done as intended, if not actually as designed. It is a difficult balance to both watch and participate as I have outlined and keep the Project Manager involved and responsive when it looks like you are doing his job. That is just one more of your challenges during the total Telecommunications System Project.
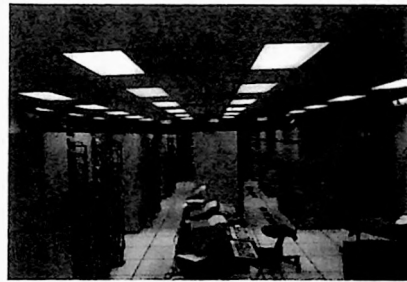
POWER CONSIDERATIONS:

Are your emergency backup systems tied to your main power plant? Some municipal laws require your entire telecommunications system to shut down if a smoke or fire detector goes off. Some only require your HVAC systems to cut off to stop air circulation. In either case, make sure these systems are fully tested and in place before

you install and turn on your switch. You do not want to test these systems while you are in an operating mode. We had one electrician come in one day to test the power by pass panel. The test failed and he crashed the system. No one was very happy, especially me.

We had another situation where one electrical contractor jury rigged a circuit to bypass the switch system shutdown feature so that the fire alarm controls could be tested without taking down our system. At some point this jury rigged circuit was taken off, but the staff doing the alarm tests were not made aware of it. The next time the alarm staff came in to do a test of the alarm system they assumed that the temporary fix to prevent the loss of power to our system was still in place. Guess how surprised we were when we lost our system by accident and nobody knew why? All your power and alarm work should be finished and tested by the time you have your switch delivered and operational. Severe power fluctuations like this one can cause numerous problems. However, the Fire Alarm system must be tested periodically, so do insist that your vendor or engineer have installed and provides a feature that will allow the testing without loosing power to your switch.

A couple of things to double check with your power;

- Has the entire telecommunications system been grounded properly and to the vendor's specifications? Do not trust that the blue prints have been followed to the letter. Have the grounding checked by someone other then the contractor that did the original work. Poor or incorrect grounding can and does cause so many problems that you may never trace the root of the problems to the ground itself unless you are specifically looking for it. We discovered after months of problems that many of them were because of poor grounding.

- if you're using a grounding rod, have you sufficiently protected it from accidental damage, if using a cold water pipe, has it been traced for other grounds or possible problems, have all the nuts and bolts been tightened properly on all power related equipment, not just hand tightened, have all the DC outlets been labeled?

HVAC SYSTEMS:

You can never have too much HVAC capacity. Sounds expensive? Try upgrading (adding capacity) your HVAC system while you are in an operational mode. Not your problem, you think that it will be your successors problem? Guess again. My experience tells me that although telecommunication systems are getting smaller and smaller and continually have less and less HVAC requirements, we are continually pressed to place more and more of this equipment into our already limited space. Although the smaller pieces of equipment are more powerful and comparatively have less HVAC needs than what it is replacing, we are concentrating more of it in less space and are in reality requiring more and more HVAC in total for smaller but more powerful equipment. These needs often appear to happen overnight.

Make sure your HVAC plans include additional taps in the piping for additional HVAC units and pumps. Are your pipes sized such that they can handle extra capacity if need be? Your design should include the ability to upgrade your system while it remains in service. If your engineers tell you that the system has been designed so that it can expand without disruption of service, ask them to go through with you how they would add an additional 40 tons of air conditioning without any disruption of service.

If they have done their jobs right there will be cut off valves where they need to be and taps and space for the appropriate equipment. Do not forget the power for the growth and added HVAC units or larger sizes. You also need the space to grow your HVAC systems into. This includes the roofs or other location where your dry coolers or water towers are.

Remember also that if your HVAC system is dedicated to servicing your operation alone, there may be a time that a full system shutdown for maintenance may be required. If this is the case, from where will the cooling come from to keep your switch in operation? Better think now of an alternative source of cooling if you want to keep your system in operation. Are there other HVAC systems that you can tap into in case of an emergency?

Now that you are sure that you have covered all of your HVAC needs, make sure that you have the appropriate equipment to monitor the system. There are many products on the market that measure temperature and humidity over long periods of time. Secure several of these devices and place them in strategic locations around your switch room and personnel areas. These devises are only good if you use them and check them regularly. Keeping logs of fluctuations is also a good idea.

OTHER ITEMS OF INTEREST:

Engineers engineer. That is not always the same as knowing the right thing to do. Our HVAC engineer engineered the switch room space per the specs we received from the vendor, the square footage and the number of staff we expected to be in the space on a normal operating basis. Did they take into consideration;

- the modem pool BTU's and the Personal Computers that would fill everyone's desk

- the seasonal variation of the space as it relates to the supplied central HVAC systems

- the conduits and raceways under the raised floor that will be blocking air circulation or did they say that the pressurized floor would take care of that

- people creature comfort vs. the needs of the switch equipment

- the holes in the raised floor where the cables come into the switch, the holes for the MDF cabling

- the moisture from the water tanks under your location (we had rowing tanks in a subbasement under our switch room)

- the fact that the cooled air picks up heat the further it travels from the HVAC unit (causes hot spots).

You have to look at all the assumptions the engineers are using and then ask how they took them into account.

If you are placing your techs and maintenance staff in an adjoining space to the switch room, how is that going to be cooled and heated? From the same HVAC system as for the switch? Is it zoned separately?

If you think the answer to these questions is yes, guess again. Engineers engineer, they do not necessarily design the HVAC or other systems as they will be used and the all inclusive environment they will have to operate in. Your job is to make sure that engineers engineer to both specs and reality, not just to specs alone. If you engineer to specs alone, you will have uncomfortable staff working in either a cold room with not enough heat or a very warm room without enough air circulation to keep them from getting sick by picking up germs from each other.

Do you provide space for your local Telco staff? Have your plans for a new switch room changed things for them also? Remember that your Telco's services are undergoing radical changes as well as yours. Their new equipment may also require additional HVAC systems and special power conditioning. Many Telcos are going digital and require more and better space that is also environmentally conditioned. Gone are the days of placing a few Telco boxes in the basement and forgetting about them. Place

their needs into your original plans. Get their input and plans on how they plan on providing you your new service and what impact it has on your environmental assumptions. Your Telco has just as much at stake in your success as you do, give them the opportunity to work and succeed with you.

If you are using a raised floor, also called a computer floor, and I would strongly recommend that you do, the higher the raised floor, the better. We had sufficient ceiling clearance to place almost any height raised floor we wanted. We went with a two foot raised floor. My years managing and being responsible for computer rooms clearly demonstrated that a raised floor quickly gets full of cables, raceways and other paraphernalia. The minimum I would install would be an 18 inch floor and go with two feet if at all possible. Many people forget to check their ceiling height before making these types of decisions, do not be one of them.

The installation of a raised floor can be more expensive then not installing one, but I would not do an installation without one. If you need some arguments for the extra money, here are a few:

- A raised floor will generally better distribute the available HVAC air by means of pressurized space under the floor. By placing the appropriate grates in the raised floor tiles, you can better manage hot and cold spots then general overhead type HVAC systems.

- A raised floor allows you to move and reconfigure your floor space a little easier by just rolling equipment around and moving and cutting the appropriate tiles.

- The under floor power is easier to move and manage for the reconfiguration of the space.

- The concealment of the many telecommunications and power cables provides a far better visual appearance of your switch room. This also helps to provide a more professional looking installation and helps the morale of the staff. Just the professional look of the space takes away the stigma of telecommunications being a bunch of wires and telephone installers. Removing this stigma alone is worth the cost of the raised floor. I provided personal tours of the completed installation to a number of the key University executives, each was impressed by the computer room type environment we had built and left with a much different impression of what telecommunications was all about.

- Adding additional cables and power lines under a raised floor is somewhat easier and can be less costly than not having the raised floor.
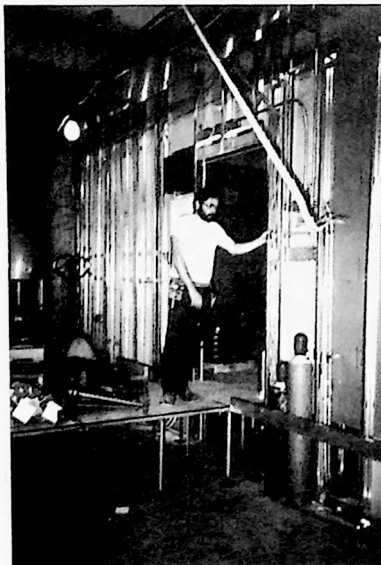
No matter how many times your contractor tells you he has cleaned under the raised floor, they will still need to do it again the last day on the job. It never ceases to amaze me what collects under a raised floor during the course of a renovation/construction project. In any case, before you turn on your HVAC system for the first time, make sure you have the space under your raised floor cleaned and vacuumed one more time. If you do not, you will have dust, dirt and whatnot flying around the room for weeks and clogging your filters.

If you can, plan on electronic access (secured access) to the switch room from the beginning. Its more expensive to do so later. There are a large number of electronic access systems to choose from. I would choose one that not only allows several levels of access to the same space and has easy management for changing codes, but also supplies you with a list of who accessed the space when. These systems often run off of a PC type system and are more expensive then just the battery operated key card/button access type locks. Over the long term they are worth their costs in theft prevention and system maintenance status that occurs during off hours.

Plan on spending extra architect and engineering funds as the switch room is built. Almost everything I have outlined concerns change in the specs and the scope of the construction of the switch room. Most architects and engineering firms will charge for the time spent in making these modifications and changes.

Some union trades do not come to work in the snow or rain or when the weather does not agree with them. I was surprised to find many of the construction crews not showing up for work because it was cold out or because the weather was not to their liking. This was true even for the trades that worked inside. I have never understood this. If you are in a city where there is a lot of construction going on, this may occur more often.

Make friends with the adjacent areas to your switch room. They will very likely be affected in some way by your renovation of the space. If they are, they will in all likelihood insist that you compensate them for their suffering or any impact you have on their space or operating area, what ever it is. Better you work with them than fight them.

Your new telecommunications system will have a number of terminals associated with it that are usually called administrative or system terminals. You have probably taken great care in making sure that your new system has some type of uninterruptable power supply (UPS) system in case of power failure or hits from your local power utility. In all this careful planning do not forget to place your critical system/administrative terminals on the same power back up system as your switch.

If you do lose power, you will need these terminals in order to control your system during this critical time period. For instance, if the power is going to be down for a considerable amount of time, you may need to power your system down. You will want to do this in an orderly fashion which will require the use of your administrative/system terminals. After you have determined how many of these special outlets you need, add six more to that number.

Halon fire suppression systems are generally designed for the current size of your switch room, no matter what your expansion capacity plans are. This is a technical problem in designing Halon type systems. You may design your switch room with growth as we did, however, you will have to either re-size your halon system later if you

grow into your additional space or supplement it with a smaller system. Ask your engineers about this. Again, this may be a good area to check with your local Fire Department about.

I spent some time watching the punch down crews placing the cables on the MDF in the switch room. I was surprised to see this 40 foot long and 8 foot high frame swaying side to side each time a pair was punched down. I finally insisted that the vendor secure the entire MDF to a wall. The swaying stopped and so did my worrying.

After you have completed your switch room and your system is delivered, installed and powered up, you have to start all over again.

- Keep a few gallons of paint on hand for touch up. The walls will get nicked and scraped from all the installation activity.

- You'll need to have your raised floor realigned again after everything is installed and settled. The installation process will likely have bent a number of struts and unsettled large portions of the floor. You do not want to leave the floor in this state. Although it is rare, raised floors have been know to collapse if not maintained properly.

- The HVAC system will have to be balanced with the actual BTU load running. Anything done before the actual load is on line is a guess. Any reputable company or engineer will agree with this.

- And, you'll have to keep everyone's hands off the darn alarm buttons.

Your switch room is one of the most critical items of the entire installation process. It deserves your utmost attention and time. Give it both, the rewards are worth it.

Chapter 8.

TELECOMMUNICATIONS MANAGEMENT SYSTEM

One of the items the Project Team was particularly proud of was our foresight to include in the original RFP the requirement for the installation of a state of the art, computerized Telecommunications Management System (Telemanagement). At the time we wrote and issued our RFP, not many RFP's were including Telemanagement Systems as part of there entire Telecommunications Projects. The inclusion of Telemanagement Systems is much more common in RFP's for Telecommunications Systems issued today. We were fortunate to understand at the time that the investment of millions of dollars in a cable plant and telecommunications equipment without the installation of a sophisticated, computerized Telemanagement System would be a bad business decision and potentially a waste of telecommunications dollars. Our past experience with Centrex billing and large complex data bases clearly demonstrated the need to have such a system as part of any base telecommunications contract. There was no way that we would be able to effectively manage a 10,000 line system with a manual telemanagement system.

What does a Telemanagement System do? In our case we contracted for a state of the art system that used an integrated filing structure and operated on an IBM mainframe computer system. The primary activities we planned to use the Telemanagement System for are as follows:

- The most common function of a telemanagement system is for the production of telecommunications usage (local and long distance calls), service and equipment bills. Our intended primary use was no different. We wanted to bring this function in house so we could control and manage our billing and rating functions easily and more effectively. This would be accomplished by performing more of the billing functions on in house terminals instead of pushing paper as we were doing then. The reduction of paper flow and storage was and continues to be a major objective for using the telemanagement system to its fullest potential.

- Along with billing for system usage there is the requirement to bill for station equipment. We needed a system that could also inventory station equipment by user, department and various other categories. Since we were installing an integrated voice/data network, the billing for data equipment was somewhat new to the telemanagement system.

● - Of primary importance was the management of the installed cable plant. The cost to install our new cable plant was as much as, if not more than, the cost of the actual telecommunications system equipment. The cable plant will certainly be around much longer than the currently installed switch and station equipment. This fact makes the proper management of the cable plant of long term paramount importance. If the cable plant is not managed from the start, you can quickly loose a major part of your investment to a muddled mess of papers, drawings and Floor Distribution Frames/Building Distribution Frames. The successful installation of the cable plant management system took a high priority in the installation.

● - An automated Trouble Reporting System. We wanted the reporting of problems and troubles to be part of the entire telemanagement system. It was considered helpful for the trouble desk to be able to call up a trouble screen that already had all the details of the line and/or station that was being reported. We also wanted this part of the system to keep a history of troubles for future reference. An automated trouble reporting system should be of equal concern to your vendor for their management of the system.

● - An automated Work Order Entry System. The integrated nature of the Telemanagement System allowed us to do data entry into the system for new or change orders and have all the affected files updated at the same time without the need to update them individually. This part of the system also acts as the primary documentation to your vendor for their part of the MAC work.

● - Directory Look-up. It would seem to make sense since you already have what you hope will be and continue to be the up to date data base of users on your system, that you have the capability to provide to your telephone operators an automated Look-up type Directory instead of using some other data base or worse yet, have to do it manually.

● - Reports, reports, reports. The mainstay of managing is receiving the right information when you need it. If your telemanagement system can not provide the type of management reports you require to manage and help you make the types of decisions you need to run a successful telecommunications system, it loses a significant part of its usefulness. In addition to the information the system needs to provide to you as the responsible management for the telecommunications system, it also needs to be able to provide information to your user community to help them manage their departments, offices, schools, etc.

A good telemanagement system can do the above and much more. However, this book makes the assumption that you have already selected the system and are ready for the actual installation.

TELECOMMUNICATIONS MANAGEMENT SYSTEMS ARE NOT CABLES AND SWITCHES

In 1985/86, most telecommunications vendors did not provide as part of their installations a comprehensive telecommunications management system. As a matter of fact, a few did not even know what they were and to what use they could be applied. The general process for selling telecommunications systems was, you buy the switch and cable (cable only sometimes) from us and you worry about the business side of running the system. Most vendors did not and still do not appreciate the intricacies of running a large telecommunications department. The situation has gotten a little better today, but not much.

Not that I want to paint an overly negative picture, but the typical telecommunications installation project manager/supervisor is one who has worked himself up from installing key equipment, to small PBX's and progressively to larger more complex systems. This is not bad! However, **THE INSTALLATION OF A LARGE, COMPLEX TELECOMMUNICATIONS MANAGEMENT COMPUTER SYSTEM IS NOT THE SAME AS INSTALLING THE CABLE PLANT AND TELECOMMUNICATIONS SYSTEM ITSELF.** This point cannot be over emphasized.

Getting assigned a Project Manager/Supervisor to your installation who has the skills to manage both the telecommunications installation (cables, stations, switch) process and at the same time the telecommunications management system installation is very unlikely. The two skill sets are just not directly transferrable.

The successful installation of a complex, large telemanagement system requires much more than just telecommunications installation experts. Because of the size and complexity of our system, the actual installation required a variety of technical personnel with expertise in many areas:

- ◉ - MIS personnel were required for various aspects of the installation. System programmers, analysts, application programmers and production personnel were all necessary.

- ◉ - Getting a mainframe package installed may require the understanding of CICS, MVS, SNA, Cobol, JCL, various file formats and other operating systems depending on the system you are installing it on.

- ◔ - The accounting functions of the system may require the input and direction of your controllers office so that the system can interface properly with your firm's financial accounting system.

The skill sets noted above, although common in an MIS shop are very different from those that the typical telecommunications installation manager has experience with. When it comes to things like cable layouts, key sheet data and features that need to be listed in the system, the experience of your vendor may be useful, but even then, only if they are familiar with the telemanagement system you are installing.

If your telecommunications vendor is also installing your telemanagement system, your job is to make sure they assign the right person(s) with the right skill set to manage and implement this system. If the assigned person has not installed your package before and has not worked on the telecommunications system being installed and does not know your hardware and software environment, you are likely in for a very difficult and disappointing time.

HOW DO YOU DO IT RIGHT THE FIRST TIME?

Of all the various parts of the new telecommunications system you are installing, not getting the telemanagement system installed correctly, all databases fully loaded and verified, all functions and features tested and, all staff properly trained, the first time and prior to cut over can have the longest term negative effects. If you are not successful in implementing your telecommunications management system the first time around, it can take twice, three, maybe four times as long the second time around to catch up to where you should have been at cut over.

The time and effort required to catch up on billing errors for system usage, equipment installation and changes, and the cable plant can take months to years to catch up with. If you are like most new large telecommunications systems installations, you will have a pent up demand for new and different service by the time you cut over your new system. This may be because of a temporary freeze you initiated during the final stages of the installation or because your user community is now much more aware of the capabilities of the new system. In either case, you will be faced with a huge surge of requests for service.

After cut over, your staff will be very busy with many changes that have an effect on your day-to-day management data bases. If your telemanagement system is not up and running on day one, all this work will have to be accomplished manually and the data entered into your telemanagement system at a later date. I have seen installations which after four years were still trying to catch up with the original installation data and problems.

It does not have to be this way! There are things you and your vendor can do to at least make the odds more in your favor that your telemanagement system will be operational before your new telecommunications system is.

- First and foremost is getting the right project team assembled for this part of the Project.

- Your vendor must have on staff a person who is fully responsible for the entire installation process from the vendors side of things. This person must already be knowledgeable with the specific telemanagement system being installed. You should not accept that this person is very smart and will learn the new system in no time at all. Telemanagement Systems are very complex and take a very long time to become proficient in. This person also needs to be knowledgeable in the telecommunications system being installed. The two systems are intricately intertwined.

- If the system is to be mainframe based, you require from your own side a knowledgeable person who can help program and prepare programs for loading the system onto your host computer. If the telemanagement system is to interact or require data from other programs or files on your mainframe, i.e., personnel files, accounting files, student records, you need to identify the right resources who can give approval and make the interactions work. Depending on the mainframe and its operating systems, you may require the skills of several different types of staff from your MIS department.

- If the system is to be PC-based with a LAN, again you need to identify the right persons in your organization to help work on it. Not all LANs are created equal.

- If you are running both a voice and data communications shop, you will want to have a representative from the data side as part of this project team. The data communications needs, although very similar to voice, may not be exactly the same.

- Data entry personnel are just as important as the rest of the team. Who ever is supplying the data entry personnel as part of the installation needs to have them available and trained for the work as soon as possible. Data entry staff that have other functions than working on the telemanagement system tend to get their priorities changed. If the priority does not remain on the telemanagement system, this will come back to haunt you later.

- To tie the resources noted above together, you need the person(s) who will be responsible for running and maintaining the system and who understands telecommunications to bring together all the resources. These could include the Billing Manager, the Service Manager, Business Manager or the Client Support Manager or who ever else may be party to the maintenance of the ongoing telemanagement system.

If you have been able to gather the above personnel as the bases of the Telemanagement Installation Project Team, you are a long way to getting it done right. One of the keys to this team being successful is keeping it together for the duration of the Project. Make sure you have some kind of commitment from your vendor on this topic for their staff assignments. Get it in writing, if possible.

● - Make sure the entire Installation Project Team sees the actual Telemanagement System in action and actually sees how it works. It is likely that not all members of the team know about the system and have actually seen it work or had any hands on experience. It should be an eye opener for most of them.

● - Setting up a schedule of dates that allows the telemanagement system to be an integral part of the installation process is critical. The time to do data entry into the system is when the work is getting done. When the cable plant is being installed, is when the cable data should be entered and checked. The same thing is true for the station design and installation. All of the accounting records have to be in place as well as the Personnel functions of the system. Remember, not getting these accomplished on time when they are due will take many times the effort and time to accomplish later.

● - Original data collection techniques and determining the correct data elements to be collected can make or brake the entire system. How do you know what you need to collect at each stage of the installation? Much depends on how you plan on using the telemanagement system. In our case, the system was to be used as a full blown management tool. We simply insisted that our vendor supply every data element that was used and or listed in our switch and compared it to the list of data elements available in the telemanagement system. This caused a number of data elements to be tracked and eventually entered into our system that normally would only be in the switch. A few examples:

● Data Access Class, this allowed us to tell directly from the telemanagement system what hosts and dial out privileges any particular data communications user station had.

● Feature Package Type, without needing to see the entire feature list we could tell by the Featur Package Type what capabilities a station had.

● Intercom Group and the particular intercom number for a station. The same for Hunt and Pick groups.

● The particular station type, whether or not it was connected to our voice mail system and the size of the voice mail box.

● What call forwarding parameters have been set up for each line? Which line on each multi-line phone rings and where?

And then there is the entire data collection for the cable plant. What pairs go where and which ones are good, bad, which ones are connected to a station and which ones are for future growth? How were the FDF's and BDF's marked? How are they marked if there is more then one per building or floor? What if you must run several floors of station cable from the same FDF? How do you identify dedicated cable pairs used for such things as alarms and other point to point services? You want to use the same nomenclature for the telemanagement system as you do for the actual cable plant. This is not always easy to do since your telemanagement system may already have it's own set of parameters that do not match your particular set up.

Then there is the whole host of information that you need that again is not of primary importance to the vendor for their part of the installation. What line restrictions are placed on each station, if any at all. If you have a full charge back system, to what internal financial account is the equipment and calls to be charged against? What

name or department is associated with each station? How do you identify phones in halls, conference rooms, classrooms, mechanical rooms, elevators? What should show up in the Directory look-up system, does the user want their private lines printed in the company directory for public or company use to their office?

There are dozens of items and combinations of items like those noted above that have an impact on your overall ability to run and manage a telecommunications system. Setting up the correct collection forms that allow your and the vendor's staffs to interact properly with your organization is no simple task. You never know who or what resistance you will run into.

> - We had intended to use the staffs Employee Identification Number (Social Security Number) as a unique identifier. The Employee ID was to be used to confirm the spelling of the name and the title and campus address of each person listed with a phone number. This would have been easily done since in the University's personnel files each person was listed with their SS# which was equivalent to their Company ID Number. Matching the SS# would have assured accuracy and saved much time. What we encountered was a huge resistance on the part of the staff to supply their SS# for the purpose of installing the Telecommunications System. It became a right to privacy issue to most administrators, even after the specific purpose was explained. The resistance was so strong we eventually had to drop this part of our information request from the Design forms.

> - There were whole departments that refused to provide a name to be associated for each telephone in use. Instead, they insisted that the main department name be used for each telephone. This issue only became clear to some after the Directory was printed and they saw thirty two lines printed with their department name next to each extension and only one phone number with the department head or director listed separately. When the department head started to receive all the calls, the issue became a lot clearer.

During the initial data entry stages, only one party, either you or the vendor, can be responsible for the data and hence the correctness of what is being entered into the system. As soon as two parties are allowed to do data entry into the same system, no one is held responsible. When there are mistakes, and there will be mistakes, there is finger pointing as to who did the actual data entry into the system. This does not mean that multiple staff can not do data entry, it does mean that they have to report to the same management, either yours or that of your vendor.

Doing the telemanagement system installation right the first time can mean the difference between the entire system being a resounding success and your company only remembering that they could not get any accurate information from the Telecommunications Office for months, sometimes years, after the initial cut over. Do not allow you or your vendor to place you into this position. Get the right resources, make the plans and set the dates. Get it done on schedule, it really counts!

RATING TABLES:

One of the difficult items to clearly understand is that of the rating tables for your local and long distance calls. Generally your telemanagement system vendor will already subscribe to a company that provide the V&H tables and the related tariffs for your originating calling area. These tables are relatively standard. However, one question you do need to ask because of the rapidly changing telecommunications environment is, "how current are the rates listed in your table?" The FCC, Judge Green, local Public Service Commissions, OCC's and increased competition are constantly making these rates change. You also want to know how often you will get updates of

these tables from your telemanagement vendor. Once a year, every six months, every quarter? Will they make special updates available if there is a major tariff change outside of your regular update cycle?

Some items to watch out for when reviewing how your telemanagement system rates the calls:

- **●** - Operator assisted calls have become much more complicated then they used to. In our area you can dial "0" and get the local Telco operator, dial "00" and get our long distance carrier operator. Some "Other Common Carriers" allow you to access their operators by using their equal access codes. How does your system differentiate calls made to either of these operators? When you have reached either operator, how does your system know what kind of call you made? Once your callers are outside your system and have an operator, they can do several things;

- **●** they can make a credit card call that should not be billed to anyone other then the credit card holder

- **●** a collect call that needs to be billed to the called party

- **●** or even place a call to be charged back to the originating extension

This last type of call can be a problem. When a caller has reached outside your system and now has an operator and asks that the operator place a call for them and charge it back to them, the number the operator may have is the central or main number for your telecommunications system, not the extension making the call. What may happen then is that your bills from your carriers will have calls charged to you on your central or main number that were placed by particular parties in your organization that can now not be charged back to them. This same thing can happen with collect calls. That is, accepted collect calls may be recorded by the carrier on the central organization number and are then not billable back to the parties accepting the calls.

These are all issues that must be dealt with and may or may not be manageable by your telemanagement system and your switch. Depending on how your Station Message Detail Recording (SMDR) data is collected, you may be able to distinguish between certain of these calls. Sometimes discussions with your carriers and local telco will solve some of these problems. Other times, you may be forced to restrict certain types of access from your switch to prevent abuse and block non-billable calls. Another potentially serious issue in parts of the country revolve around what have been called "Porno Lines." These services received this name when it become well publicized in the media that children were calling up these unique numbers and were listening to either prerecorded messages or real people talk about sexual topics. There are also other services provided under the same "porno" exchange, such as calling for your Horoscope, your daily biorhythm numbers, or for dating type services.

All of the services noted above have one thing in common, they are usually non-tariffed services and can charge anything from $0.20 per minute to $20 per call or any other rate they deem fit to charge. The way these charges usually work is that the telco charges you the rates determined by the service company, bills you with their normal billing programs and pays the service company directly for your calls to them. What is the problem with this?

In practice, you may not agree with some of the material being made available via these pay-for-time services. But if you need to account for these charges, you may have a problem. Most rating programs that come with telemanagement systems are based upon published tariffed rates. These services do not fall into this category, hence are not generally found in these rating tables. Further complicating this situation is the proliferation and then bankruptcy of these pay-for-time companies. It is almost impossible to keep track of them and their related charging schedules.

The same exact issues revolve around the accounting and charging back of these types of calls as was outlined above for the 0+, 00+ and operator assisted calls. One difference is that the rating structure of these pay-for-time types of calls can potentially add up much faster than the other types of calls.

How do you, as a business, protect yourself against these pay-for-time types of calls? One method is to decide that these calls suite no business purpose and block them entirely from being called from your switch. If however, you do determine that certain of these types of calls do suit your business purposes, you should be able to arrange to have all calls blocked from being made from your switch with the exception of those that you want to be made.

Trying to deal with these small nuances of the calling and rating the types of calls outlined is important. If you do not address these issues and set the policies and guidelines prior to the start up of your system, you will spend needless time later tracking down calls and looking for ways to charge for them. The time spent now will ;ave you much time later.

All of the above notes on Rating Tables assumes that you have to account for all the calls placed through your system and have a full charge back system to your user community. Even if you do not have a full charge back system in place, I believe that your superiors will want to know that the toll calls for the organization are being monitored and that you are being charged correctly for them.

Rating your toll calls in many organizations may be determined by how the call is processed through the switch and what network facility is actually used for that particular call. This means that if a call is placed via a DDD, Direct Distance Dialed, circuit it may be billed differently to the end user then if it went out via a WATS line or Foreign Exchange (FX) circuit. This type of billing is not unusual. For it to work though, you need to make sure that the switch trunk information, the codes used to identify trunk groups or types that are generated through your SMDR, matches that of the telemanagement system. You do not want your DDD overflow calls being rated at FX rates, not unless that is what you have decided.

Do not underestimate the small nuances of this procedure. The incorrect rating of calls has caused the loss of significant amounts of money to Telecommunications Departments around the country.

A final word of caution on rating calls and the facilities used for making the calls. Check your tariffs! The time of day and day of week the call is placed may make a difference as to the carrier facility you will want to send the call over. This is even more important as your network gets more complicated with different OCC's, FX, DDD, overflow and other types of circuits. You can not assume that a call to a particular place

will always be less expensive by using a particular facility. You may find that the evening or weekend discounts on your DDD common carrier tariffs are less expensive then the WATS type service you use during the day, or vise-versa. Check it out.

PBX DATA VERSUS TELEMANAGEMENT SYSTEM DATA:

Any experienced MIS or Telecommunications professional will tell you, whenever you have two data bases tracking the same information with separate sources and methods of data input, one of the data bases will eventually get corrupted. This is historically how telecommunications system data bases have been kept. You generally have a data base that is maintained in the switch for purposes of providing the actual telecommunications services and a data base maintained either manually or on a separate computer system for the managerial administration of the entire telecommunications system. The law of averages, and just the sheer volume of paper work required to keep a large, complex telecommunications system operating guarantees that one or the other, and unfortunately sometimes both, of these data bases will be wrong in one way or another.

The larger and more complex the telecommunications system, the more difficult it becomes to maintain the separate telecommunications data bases "in sync." With this knowledge, we specified something quite unique at Columbia during the RFP process. What we originally wanted was a single source of data entry into both the telecommunications system switch itself and simultaneously into the telemanagement system. This appeared to us a very reasonable and obvious solution to the dilemma of maintaining the two data bases. To our surprise, not a single vendor was able to deliver thi solution in total to the two data base issue.

We did however have a fall back position to the single point of entry requiremer. If you (the vendor) can not provide a single point of entry, you then must be able tc provide the capability to electronically compare the two data bases generating exception reports of those data elements that do not match. This is what eventually was done.

As simple as this process appears on the surface, it really is quite complicated and requires a great deal of study, programming and close coordination. However, the efforts are worth it. The ability to periodically electronically compare the two data bases will save enormous amounts of man power and money. Your telemanagement system will always correctly reflect what is in your switch and hence you will be billing and collecting for all the services you are providing. This is commonly the biggest problem with any large telecommunications system.

Generically, this is how the process may develop:

- Your vendor must first determine what data elements, i.e.; station type, location, features, data option, voice mail option, class of service..., in the switch reside in files that can be safely down loaded. This is an important point. There may be information in the switch that you would like to electronically compare to your telemanagement system but can not be safely or reliably down loaded. You will, most likely, have to depend entirely on your vendor for this information. The switch software is probably considered proprietary and you will not have direct access to it.

- Once the data is identified on the switch, how you transfer the data off the switch can be a problem. Further, the format that the data is down loaded is important. It must be in a format that can eventually be up loaded and used for processing by your host computer system.

- The switch data may be directly down loaded to your host computer or, some intermediary devise like a personal computer may be used. Under our set up, the switch data was first down loaded to a PS/2 system running Netview PC software. The switch data was then reformatted on the PS/2 system and then up loaded to our host IBM 3090 computer system, again using Netview PC with a host version of Netview operating on the 3090.

- Prior to this point, you should have determined what data elements would be compared between the two data bases. Once the switch data has been successfully loaded to the host computer system, the programs that were written to compare the two data bases can be implemented. You have to watch out that the authors of this program really knew what was being compared to what and they are indeed the same item on both systems. Again, this sounds very logical and silly, but just wait till you run the compare program for the first time and see what the exception reports look like. Unless you are very lucky and have some very talented and dedicated personnel working on this entire system, you will have reams of paper kicking out discrepancies between the two data bases. Much of these discrepancies will be because of poor programming or the authors not understanding the definitions and terms of the two data base systems. Other differences will be due to errors in the original data entry, the recovery of which is what this entire system is being developed for.

- When legitimate errors are detected through the compare sequence noted above, the process you establish within your own organizational framework for researching and correcting the data base file that is in error is one you will find the best solution for. In some organizations the staff responsible for the accounting functions may be assigned this task while in others the system designers may be.

- How often you run the compare programs will also be determined by the level of activity you experience on your particular system. For low volume systems, once a month might be sufficient, for more busy systems, many moves, adds and changes, you may determine that a weekly run is necessary or even more often then that.

The full implementation of our PBX/telemanagement system data base comparison program was the only way we could have successfully managed both the original telecommunications system installation and the subsequent day to day management. Without such an electronic routine, we would have constantly been manually running reports and checking to keep the two data bases "in sync." We make several hundred changes a week to the two systems and require the use of what we believe is a very unique set of programs jointly developed by us and our vendor.

At the writing of this book, I am not familiar with any telecommunications vendor's product that allows the specific comparison of data elements as outlined above or has a single point of data entry for both the PBX and the telemanagement system. I would hope that as the telecommunications vendors become more familiar and engrossed with what it takes to run a large telecommunications system from the customers perspective, that these types of systems will become available as a standard package with their product offerings.

Is this asking too much?

The last item of concern on this subject. Who is responsible for the on going maintenance of the telemanagement system you have purchased? Almost any software package under goes new releases and updates. You will have a great investment in this system when it is correctly installed and operational. Making sure that your system remains current and continues to serve your purposes is a joint responsibility of yours and the vendor. Understand the agreements and get them in writing.

There is one area where new releases and updates can be a big problem. If your vendor has done some special programming for you in the standard software release, when new releases are issued, will they include the special programming done for you in the previous release? The answer to this question is very important. It places the responsibility either on your MIS department or your technical staff or on the vendor. You both need to know how this will be handled *and* get it in writing. The last thing you want is to install a new release and find all the special functions that worked for you before have disappeared from the system.

Chapter 9.

TRAINING AND INFORMATION DISSEMINATION

THE END USER:

Your brand new telecommunications system will only be as good as your user's utilization of the system is. If your user community just uses it the same way they did the old system, they will wonder why you installed a new system to begin with. If they can not utilize or understand the new features of the system that you have touted as one of the reasons for acquiring it to begin with, they will be equally unhappy. One of the primary purposes of training is to address these two potential obstacles and overcome the user's objections to it.

You have probably heard all sorts of horror stories about trying to train a user community on the use of a new telecommunications system. Training programs that did not work, staff that would not come to training sessions, systems that did not work the way the training sessions instructed the users to use it and the switch that did not operate when training was in session. Training does not have to be this way. I hope to outline some ideas and methods in this chapter that will help you organize your training and hence, the overall acceptance of your new system.

To do training correctly, you will have to have started the idea at the negotiations table. If you were prepared and a little lucky, you will have negotiated for your vendor to supply good training support of the type you specifically need for your user community. Some of the items you will have wanted to negotiate for are:

- A total number of professional trainers that will allow you to provide education and training to your entire user community within a few weeks of the system being made available for general use. Use of trainers for specialized training of your senior management and for roaming training during the first few critical weeks of the system.

- Don't forget appropriate training for students, weekend and evening workers. You do not want your vendor charging you for overtime to train those staff that do not work the normal 9-5 work week.

- You will want to arrange special training for your data users. If you have an integrated voice/data system, to use the data side of the system it is not just "touch the data button" training that is needed.

- If you have also installed some attached processor like a voice messaging system, you should include training for this application also.

- A variety of training materials will add up very quickly and cost a small fortune unless previously contracted for;

● Specialized training material particular to your organization. This include special flyers, books, faceplates and other training aids

● Training video tapes, both for the new system and its attached processors. Professionally prepared training tapes can be very useful as part of the total training program. They can also be very expensive to produce.

Depending on your company size and location there may be other items that you will have wanted to negotiate. However, this chapter assumes that you have minimally covered the basics with your vendor.

You will run into those staff in your company that will insist that they do not need to be trained or oriented on how to use the new telecommunications system. Some of them will be correct, most of them will be wrong. The arguments for not needing to be trained will range from, I did not need to be trained on the one we now have and who needs all the new features anyway? These are the same staff who will be calling you later for personalized training when the new system is up and running and you have completed your corporate wide training program. They will have, of course, refused to come to the formal training sessions.

The analogy I use for most people who complain about training or believe that the new system is to difficult to use anyway is as follows:

To drive your old 1957 Chevy, all you did was open the car door, place the key in the ignition, start the car, place it in drive and go. Today you bought a new 1990 Cadillac. If you want to fully enjoy the new compact CD dual speaker stereo player, the automatic sun roof, the new environmental controls, the electronic seat adjustments, cruise control and the built in radar detection unit, you will have to either read the manuals or have someone show you how to use these features to help make your driving more enjoyable. Or, you can simply open the door, place the key in the ignition, start the car, place it in drive and go.

The new Telecommunications System is the same way. If the phone rings you pick it up and say hello, just like you did before. If you want to place a call, you can still pick up the receiver and place a call. However, if you want to use the more advanced features of the system to help make your telecommunications easier and more efficient, you need to be trained on the system or read the manuals.

This short story does not always work or convince the die-hards who are against anything new, but it will usually make the point. Time and time again, when discussing the system with unhappy users, they invariably were people who either refused to go to a training session or read the training materials. This attitude however, is not the exception and needs to be addressed during your training planning.

Our training planning was very much a group effort. We worked closely with our vendor and sought input from our user community. We did a number things right in our training planning:

- First, as noted in an earlier chapter, DESIGN ISSUES, we established a finite set of Feature Packages. The establishment of the Feature Packages set the basis for the training sessions. We did not have an unlimited variety of features to train our staff on. In addition, once people got used to one set of features on any of the Feature Packages, they would be able to use any phone and any feature.

- We decided at the outset not to try and introduce all the capabilities to the users at the training sessions. Instead, the training sessions concentrated on the basics and then progressed to the use of the more advance features. The idea was that if the users could utilize the basics with a certain amount of proficiency from the beginning, this would encourage them to learn to use the advanced features.

- The University provided our vendor's training staff with a course outline that we wanted them to follow. It included all the data that was particular to us as an educational institution and did not fall into the generic training course they were use to.

- We had our vendor go through several dry runs of the training program. Each time we altered and honed the presentation to our particular requirements. We invited several users to the dry runs to get their input from the novice point of view. The repeated dry runs were one of the best ways we insured that the training classes covered what we had agreed upon was required and presented in way that we thought our users would comprehend the best. It took the trainers some time to acclimate themselves to our way of doing things, but once they did, we were on our way.

- We kept the training sessions small. We allowed and hence scheduled no more than 20 people at a training session. This allowed for more personalized training for those that asked for or needed it. The large auditorium type training I have experienced does not work. The filmed overview and discussion of the features does nothing for the user in terms of its application and use in their environment.

- Every training room had a fully functional station for each training participant. Each feature that was demonstrated was also used by each person in the class. Your system obviously has to be up and running reliably for this type of training to take place.
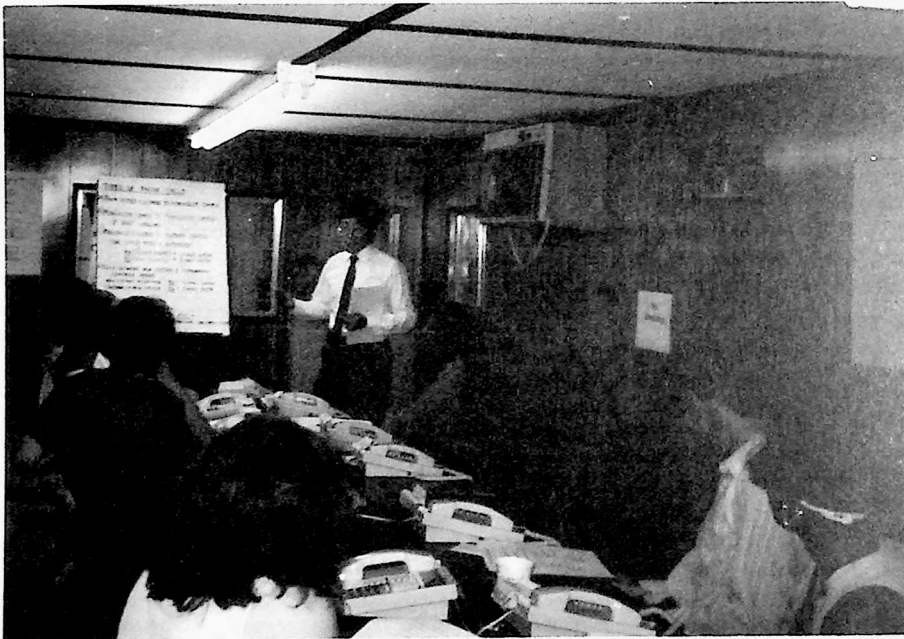
- Each training session was scheduled for one hour and fifteen minutes with fifteen minutes between sessions. More then enough time to go over the basics and the advanced features that were of interest to the participants.

Columbia University/Barnard Training Session Outline
on New Telecommunications System

[At end of session, please take a Quick Reference Guide.]

I. Introduction

A. General Description of New Telecommunications System

1. Voice Communications: Focus of Training Session
2. Data Communications: Data transmission capability
3. PhoneMail System: Voice messaging system

B. Main Goals of This Training Session

1. Trainees become familiar with New Dialing Plan
2. Trainees learn Essential Skills [See Section III.]
3. Continue business as usual

II. New Dialing Plan

Includes New Exchanges, How to Reach an Outside Party, On Campus Calls, etc.

III. Essential Skills Training

A. Three RolmPhones: 120 Single-line, 240 Multi-line, & 400 Console

B. Typical Current Centrex Capabilities & How To Access With IBM/Rolm System

Centrex	IBM/Rolm
1. Make Calls	1. Make Calls (plus Camp)
2. Answer Calls	2. Answer Calls
3. Hold	3. Hold
4. Pick-up Lines in Group	4. Pick-up lines in group
5. Intercom	5. Intercom
6. Call Transfer	6. Transfer
7. Conference Calls	7. Flash a) Consultation
	b) Conference

IV. Additional Capabilities With RolmPhones

	Other:
System Forward	External Call -double ring;
Station Forward	Internal Call -Single ring
Park	Ring Volume
Station Speed	Voice Volume Up or Down
Save/Repeat	Ring Tone Selection -
Repertory Dialing	(Dial Tone, Press *572 [1 to 8]
	and Hang Up)
	Some Phones:
	Speaker and Mute Buttons
	RolmPhone Model 400 Display

6/30/88

- Each participant received an individual Quick Reference Guide that outlined the use of all the features we had made available. These were the vendor's traditional user guides. We also supplied special handouts at each meeting describing the University dialing plan; how to make a call off the campus, how to reach the various tie lines, how to use the Personal Security Code (authorization codes). This special information was also posted on a board in each training room.

- We did not try to do all the specialized training at once. Separate classes were set up for instruction on the use of the data option on our system. In addition to the separate class on data, we spent a great deal of effort in the development of special training guides on the use of the voice messaging system and the technical use of the data features. These special guides were made available to the entire campus community plus all the students.

- We used the University personnel system to print mailing labels for the entire campus. These labels were sorted by building, which was how the stations were being installed. After a particular building had all of its stations installed, a special training admissions ticket was mailed out to each individual in that building. The ticket noted the time, date and place they were scheduled for training for the new Telecommunications System. If the given time and date were not convenient, they could call a special number and reschedule for another time.

Telecommunications Training
Admissions Ticket

Good For One Training Class at

Place: Johnson Courtyard *(Btwn Johnson & Law bldgs)*

Date: _____
Time: 12:30pm - 1:45pm

If unable to come at above time, call 2323 between 10:00am and noon to re-schedule. Or from Sept 1st on come to an 8:00am or 5:00pm class (when seats are unreserved and, therefore, not guaranteed).

RolmPhone Quick Reference Guides Available at Classes

Office of Telecommunications Operations, Service and Design

- In addition to the scheduled times we had reserved for training, we held several open sessions where admissions tickets would not be necessary. These were generally the first and last sessions of the day. The first session started prior to 9am while the last session extended past 5pm. If you have the space and staff, you may want to schedule an open session during the normal business hours to help encourage staff to come.

- We offered an incentive for staff to come to the scheduled classes. The admission tickets already had the name and local address of the attendees. The tickets were collected from those staff that attended the training sessions. We then held a drawing once a week for a gift certificate for use at the University book store. We would liked to have offered a grand prize but could not get our vendor to part with the money. You may want to check with your legal council office to see if there are any local laws concerning raffles in your area.

For any incentive to be affective you need to advertise it widely and often. We announced the winners of the gift certificates in our Newsletter each time it was issued during the training period.

- In addition to the mailing of the admissions tickets, we attempted to call the staff the day before they were scheduled for training to remind them of their scheduled session. I believe that this personal touch helped increase the total number of staff that attended their scheduled training classes.

- During the three months of training, we made it a policy not to distribute the training material to individuals who refused to go to a training session. If you wanted the training material, you were required to go to a class. This irked a number of people. But we believe that it encouraged more to attend than it troubled. When training classes were completed, we did honor requests for copies of the training material.

- We identified 25 to 30 key senior executives on the campus for private and personalized training for them and their secretaries. To my surprise, more then half of these key executives opted to go to the normal training sessions and turned down the offer for private training in their offices.

Doing everything right is unfortunately no guarantee that your training program will be well attended and successful. My philosophy on training is: your responsibility is to organize and provide a comprehensive training and instruction program that will familiarize the user community to the new telecommunications system in a timely and efficient manner, you must be prepared to offer the time, space and material for each user in your organization and provide incentives for them to learn the new system. If you have done all this and not a single user comes to a training session, you have still done your job.

The only other alternative to this approach is for each user to be required by management to attend a training session. This only works if the management is serious about the training and allows for the time. If an organization's life blood is based upon the appropriate application of telecommunications systems, then attendance and training incentives take on a totally different perspective.

Now that you have all your training plans prepared, all that's left is finding the appropriate space to have the training sessions in. Finding dedicated training space may make the rest of the training items look like apple pie. In our case we required 10 dedicated training rooms for upwards of 8 to 12 weeks. The space had to be dedicated for training purposes because we were going to spend the time and money to have temporary stations installed for individual instruction. To move this equipment around would not have been very practical.

I do not know of any large University with classrooms to spare, not at least during the semester. Most corporations will find themselves in the same position. This could very well be your single largest problem in training the user community. Do not take this problem lightly if space is a problem in general. Refer to the chapter on SPACE for more information on this subject.

TRAINING YOUR OWN STAFF:

Training of your own staff is a totally different problem. During the course of the actual telecommunications system installation you will most likely find yourself in an impossible position. You and your staff may still be running your current telecommunications system, managing the new installation and all the while solving a thousand problems a day. However, it is critical to the success of the new system for you and your staff to be proficient in the use of the new system.

One of the best and most efficient ways for you and your staff to learn the new system is for your vendor to make it available to you for your use during the installation process. Generally what this means is a small version of the system installed at your

premises just for your department's use while the general installation takes place. This may or may not be at an additional cost to you depending on your vendor and how you negotiated your contract. However, you and your staff having this real time experience months ahead of your organization is critical to your team being leaders in the use and proficiency of the new telecommunications system. This is especially true if you are going to be using either data or voice mail, or both, in your total system.

Learning how to use the new system is not the only area you and your staff require to be trained in. There are the technical aspects of the system, the plant, the switch and any peripheral devices and the telecommunications management system. Each of these have their challenges.

We hired several field technicians late in the Project. Their primary responsibility was to work on moves, add-on changes (MAC) and not the switch. These technicians needed to be trained and acclimated to the newly installed plant and the installation methods used in order to maintain the plant into the future.

Training these field technicians my be a problem if your vendor has subcontracted the plant work to a Union shop. Our vendor used a Union subcontractor for the entire cable plant installation. We could not complain about the end result of the cable plant installation, it was first rate. However, when we asked our vendor to allow our newly hired technical staff to spend some time with the installation crews in order to see how things were being done and get some field training on the newly installed plant, the Union denied the request because our University staff were not union members. We ended up with our vendor having their technicians trained and then have them train our staff along with their own permanently assigned technicians. It all worked out in the end, but it could have been much easier if the original installation crews were more cooperative when training and education were concerned.

How much do you need to know about the technical workings of your new System? That depends on several elements; how you plan on maintaining the system, self maintenance, contract or something in the middle, the technical skills of your own staff and how you feel about the technical proficiency of your vendor's staff.

Our philosophy at the beginning of the Project was that the System was going to be under a one year warranty from the time we accepted it, hence, all maintenance was the responsibility of our vendor. And in fact this was the case. In addition, we did not see ourselves getting into the self maintenance business right after the warranty period was up. With this philosophy, we anticipated having some time during the warranty period to decide who should go to the vendor's technical training programs and when.

I would strongly recommend against this approach to training someone on your engineering staff on your new Telecommunications System. As it turned out, not having a technically proficient engineer on the University staff at the beginning was a significant disadvantage to us.

Any new telecommunications system is a very complex, specialized computer system. Although you must rely on your vendor's expertise for the proper maintenance of the system, you are generally placed in the position of constantly challenging their systems knowledge and performance. To do this effectively, you really should have a working knowledge of the system.

Although we did not have any of our technical staff trained, we were fortunate in that we insisted on a complete set of the technical manuals to our system prior to anyone on the staff having graduated the vendor's technical courses. Allowing us access to these manuals was an exception to the rule the vendor usually adheres to. We were further fortunate in hiring a very competent and experienced telecommunications engineer at about the time the system came on line. Between having access and actually reading the technical manuals and having on staff an experienced engineer, we were able to somewhat cope with many of the deficiencies of our vendor's technical staff. This combination allowed us to ask precise questions and generate enough concern by our vendor when problems arose that something was wrong and that advanced actions needed to be taken.

What should you do? Not all vendors' technical staff are created equal. Your vested interest in the performance and maintenance of your system is greater than that of your vendor, no matter what they say. If you can afford it, the combination of the size and importance of your system to your institution will generally dictate this, you should have at minimum one of your communications engineers attend the vendor's maintenance courses for your system. This will be difficult to manage during the installation process because these courses are generally several weeks long and expensive. Nonetheless, unless you are willing to abdicate your responsibility of the welfare of your system to your vendor, you must find the right person, the time and the money.

The training and education of your staff is a much different issue than that of training your user population. You should decide early on that you are going to be the leaders in the use and education of the new telecommunications system and take the appropriate steps to accomplish these tasks. If you can not take care of your department first, you will have a much more difficult time later with your user population.

INFORMATION DISSEMINATION:

Formal training and education as outlined above is only one method available to you for educating your user community. If you take the approach that the dissemination of information is a commodity that should be used during the entire installation process, then the formal user training towards cut over is just another step to the total installation process. I suggest that you determine at the beginning of the Project that you will use various means to communicate to your user community what progress is being made. This continued communication will aid greatly with user acceptance. You are less likely to have resistance to the new system if your users have been party to the progress and have an understanding of what is going on. How can you accomplish this information exchange?

TELEPROJECT NEWSLETTER

In all likelihood, your new system will be very different from what you are currently providing your user community. Just as likely, your user community will not believe that they have to get very involved with either the installation or the design of the new system. Many users will either assume that a telephone is a telephone or that the installation and design is not their problem. They are wrong. It is better that they find this out sooner than later.

Tele

ommunity

Telecommunications Operations & Service Center

News Letter

Columbia University
Telecommunications Project

Intercom? Yes!
But Which Way?

By Neil S. Sachnoff

The Intercom of the new 240's and 400's is one of their most useful yet most mis-understood features. We have designed the Intercom feature so that it does not interfere with the use of the assigned lines on the stations. Here is the normal way the Intercom feature is used:

• You depress the button next to the "INTCM LINE" feature line. This activates a line for the intercom call to go over.

• You depress the button next to the "INTCM" feature line. This is the button that actually activates the intercom feature.

• You then press the two or three digit intercom number (the size of your intercom group will determine how many digits are in the number) you are trying to reach. The station you are calling then emits a tone that allows the called party to know that an intercom call has been placed to their station.

• The called party then has two options: 1- they can use the hands free intercom feature which has automatically been turned on by the calling party and just speak in response to the tone or, 2- they can pick up the handset and carry on a more private conversation with the calling party.

• The intercom connection is broken when either of the parties hangs up or terminates the intercom call.

This type of intercom, which allows "hands free" use and automatic activation of the speaker phone, has become quite popular on the campus. It allows staff members to respond to an intercom ring without coming over to the phone and/or lifting the handset. You can actually answer the intercom from almost any place in your office by just speaking in your normal voice.

There is another way in which to use the intercom feature that does not automatically turn on the speaker phone on the called party's station. You may want to use this option if you feel the two way open speaker for the intercom does not provide the privacy you need. To make an intercom call like this you follow the instructions as outlined above, but you do not depress the "INTCM" feature line button. When only the "INTCM LINE" button is used and then the two or three digit intercom number, the called party must lift the handset or press the "SPKER" button to answer the intercom call. The two-way speaker will not automatically be activated.

With a little practice you will learn the difference between these two ways of using the intercom and decide which one suits your office's needs best. If you have any questions on this or other features, please call our design office at ext. 44026 or 46254.

Bills, Bills, Bills

by Neil S. Sachnoff

Billing for use of CTS will begin shortly. However, because of the parallel system we currently have in place, running both Centrex service and CTS at the same time, the billing will be somewhat strange for a few months.

First of all, you will be receiving two sets of bills. One set will be the same type you are used to receiving from the Office Of Telecommunications Operations, Service and Design. These bills will detail the current Centrex usage and equipment. The second set of bills will be from the new billing system and cover only those calls made from CTS using your new RolmPhones. The bills from CTS will look very different from the ones you are used to receiving. Also it will require several months for us to place on the new bills all the details we would like to provide you. The purpose of the two billing systems is to allow you to continue using the Centrex system while learning how to use the new telecommunications system. During this interim period, we will bring the data and voice messaging systems on-line.

During the next few months we will be tracking the usage and available discounts available to the University for long distance calling on its new telecommunications networks. We will adjust the rates accordingly to provide the best possible cost per minute for the entire administrative user community.

We hope you will bear with us during the time you are receiving two sets of bills. This is the price we pay for having a parallel system in place that allows the University to go safely from one telecommunications system to another. Rest assured that although you will be receiving two bills, you will only be paying for service once. By January 1989 we plan to have the totally new CTS system and its associated billing/accounting and management systems up and running for the entire morningside campus.

If you have any questions about implementation of the new billing/accounting system, please send them to: Office of Telecommunications Operations, Service and Design, Central Mail Room 185, OTOSD Accounting Office.

I Only Belong To You

The wiring for the new Telecommunications system was designed to allow maximum flexibility. This includes allowing moves of staff from one location to another and use of the new cable plant with Local Area Networks. However, as good as CTS is, it is not a miracle worker. We have been asked, "Why can't I just unplug my new Rolmphone from one jack, move it to another jack and have it work there as it did in the original jack?" The way CTS is set up, each individual station and its associated jack are directly connected to the new switch in Low Library. Within the switch, each jack is identified as to telephone number, location, type of station, and other details that allow us to manage the system. Furthermore, only assigned stations and jacks are terminated at the switch, so that moving a station to another jack will prevent it from working altogether. Each assigned station belongs only to a specifically assigned jack.

Please help us maintain the system by not unplugging new station equipment and replugging it in other unassigned jacks. If you need a station moved or reassigned to another location, the proper procedure is for you to fill out a University Requisition form with the appropriate information and forward it to the Office of Telecommunications Operations, Service and Design, Central mail Room 185, Designers Office.

by Neil S. Sachnoff

Ends and Odds

Data Hot Line

From November 5 to November 8 (Election Day), Columbia's data switching network will be cutover from the current PACX to the new IBM/ROLM 9751 system. Please watch system messages, the PACX banner, and "call help" on the IBM/ROLM switch for up-to-date information. Additional information is in the October issue of the CUCCA Newsletter (Vol. 21, No. 7).

Immediate questions about the switchover or anything else about data communications on the new system can be addressed by calling the CBX Data Communications Hotline at x4-2455 or sending electronic mail to rolm-data@cunixc.

New Wiring, or Point to Point Pricing

As of January 16, 1989 a connection service will be available for point to point wiring. A first time connection charge of $45 and $15 for each subsequent connection has been established for a point to point cross connected pair of transmission wires. This pricing assumes that all related orders for such wire pairs come in at the same time and that the work is done at the same time. There is a rental rate of $1/month for each such wire pair.

Caveat Conference Caller

The Quick Reference Guide has a slightly inaccurate account of Conference Call procedures for dropping the last extension called. Note the following corrected version:

While building a Conference Call, one may get a busy/unanswered extension. Since the central switch doesn't recognize the busy/unanswered extension as a valid part of the conference, to drop such an extension from your Call Conference procedure, simply Press CONNECT.

*However, if you wish to drop the last connected party, i.e., the last extension validly added to the conference, you may do so by pressing FLASH & * * 4.*

Office Of Telecommunications Operations, Service And Design
Charging Schedule (Effective January 1, 1989)

ITEM DESCRIPTION	Monthly	Installation Existing Jack	New Jack
120 (Single Line Set)	$35.00	$100.00	$350.00
120D (Single Line Set w/Data)	50.00	100.00	350.00
240 (Multi-Line Set)	55.00	100.00	350.00
240D (Multi-Line Set w/ Data)	70.00	100.00	350.00
400 (Console w/ Screen)	65.00	100.00	350.00
400D (Console w/ Screen w/ Data)	80.00	100.00	350.00
244PC (Hayes Compatible)	70.00	100.00	350.00
DCM Only (No Voice/Data Only)	20.00	100.00	350.00
DCM Added To Existing Voice-Only Set	See Above	200.00	N/A
CPU Host Port	25.00	200.00	350.00
FAX Connection	35.00	100.00	350.00
Additional (New) Extension On Station	15.00	25.00	N/A
Additional (Existing) Extension On Station	N/A	25.00	N/A
Personal Security Code	0.50	25.00	N/A
Point-To-Point Cable (Per Pair)	1.00	15.00 $(2 > n)$	45.00 (1st)
Headset & Adaptor	3.00	25.00	N/A
Feature Package Change	N/A	25.00	N/A
Line Restriction Change	N/A	25.00	N/A
Long Handset/Station Set Cord	N/A	35.00	35.00

Admin PhoneMail

Basic Four Messages	0.00		
Up To Ten Messages	5.00		
Up To 25 Messages	10.00		

PhoneMail Call Processing

Menu-Driven (Listen Only Per Box)	3.00		
Menu-Driven (Listen/Respond Per Box)	5.00		
Menu-Driven System Service Charge	3.00		
Non Menu-Driven (Per Box-Announcement Only)	3.00		

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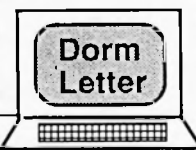
Dorm Letter

Columbia University
Telecommunications Project

Columbia University Telecommunications System

Student Fact & Sign-Up NewsLetter

by Karl Pettus

The Columbia University Telecommunications System has arrived at Columbia! Well, it is arriving anyway -- a process which from blueprint to cutover which will begin phasing in as of September 1, 1988, will have taken four years. With the help of IBM technology and the Columbia University telecomm administrative and operating team, a new era in voice and data transmission is at hand.

What does this mean for you as you battle your way to a Columbia sheepskin? Basically, a new standard telephone in your room and a different, faster, and more efficient way of communicating through that instrument. In the long run, it will mean cost containment while providing exceptional telecommunications services. It will bring you into the modern age of communications!

Look at What You Get!

The new RolmPhone, PhoneMail, data communication access, Personal Security Codes, a feature package, free intra-campus calling, and competitive local and long distance calling rates are among the many offerings which will be made available to you.

New Exchange - 5 Digit Extensions
- New Dialing Plan

The new exchange for Columbia dormitory telephone numbers will be 853, while for administrative lines, the exchange will be 854. Most of the extensions will remain the same. However, there is a change in dialing procedures. All intra-campus extensions will be reached by dialing five digits instead of four. To connect with dormitory extensions, one will use one prefix, while to reach administrative lines, one will use another prefix.

To access other dormitory extensions, one will prefix dialing with "3." For example, if you were trying to reach dormitory extension "1000," you will dial "31000." To reach administrative numbers from dormitories, one will prefix dialing with "4." Extension "3231" will become "43231." From the outside, the same seven digit dialing is maintained. The new dialing plan allows us potential use of some 20,000 numbers instead of half that number.

RolmPhone - Lots of Features

The RolmPhone 120 is the instrument you will find in your dormitory rooms. Anywhere a Centrex telephone or active jack is provided now, a RolmPhone will be in its place. You no longer have to bring a telephone to school! You'll find a new, more capable telephone just waiting for you! This state-of-the-art RolmPhone is a durable and comprehensive complement to the new main switch for the IBM 9751 system.

The standard features on the RolmPhone station are considered "extra" on many other telephones. This "120" feature package includes the following:

A. The **Hold** button disengages a call temporarily while you attend to a matter or let someone know that a call is waiting.

B. The **Camp-on** feature rings your extension back after you have reached a busy line, when the party you have called hangs up. No more time is wasted dialing repeatedly to a busy line. When your station rings, you pick up the receiver and the line you called begins to ring. (This feature works only on intra-campus calls.)

C. The **Transfer** feature allows you to switch a call to another line.

D. The **Connect** feature permits one to

1. Accept a call which has camped onto your line
2. Reconnect with a call you have transferred to another extension that does not answer or is busy
3. Alternate between two lines to speak to two callers

E. The **Flash** feature permits a call to be placed on "soft" hold while you answer a second call coming in or access another feature on the RolmPhone.

F. Finally, there are two **Volume Control** buttons which raise or lower the voice of your party, but your party detects no change in volume.

All of the above features will have easily identifiable buttons labeling its function. These features will make communicating more convenient for you while using your RolmPhone. Even more exciting is that after the initial cutover phase is completed in Spring of 1989, there is the possibility of increased feature offerings in the future.

What Service Is Available and Where?

Eventually, four types of telecomm service will be offered in the dorms, although all the services will not be available in every dorm. They are Columbia Student Service (CSS), Columbia Private Service (CPS), NY Tel Centrex Service and NY Tel Private Service. CSS is offered exclusively in Schapiro Hall and Barnard's new dorm as of September 1, 1988.

CSS and CPS Have Great Advantages

Having Columbia Student Service or Columbia Private Service has many advantages over New York Telephone-provided service. Here's a list of some of the great things that are included with these services:

- No additional message units for intra-campus calls
- Higher speed data connectivity
- RolmPhone features
- PhoneMail
- No additional equipment costs (unless you contract for Private Service or for a Data Communications Connection)
- Competitive long distance charges
- Abbreviated intra-campus dialing
- No installation charges
- Personal Security Code
- Elimination of telephone billing disputes
- No deposit

Columbia Student Service (CSS)

Living in a Columbia or Barnard dormitory will have special advantages when the spring semester of 1989 arrives. The RolmPhone station (or instrument), free intra-campus dialing, PhoneMail, Personal Security Code, installation (which is already done) camp-on, volume control, and the hold and flash features will all be standard in dormitory residences. The only cost to you will be the normal amount included in your residence halls fees as is done currently with Centrex, the cost of local and long distance calls and the time it takes to sign up for service.

CSS provided service will be available in most dormitory residences. Those dorms include

Carman
47 Claremont
Furnald
Harmony
John Jay
Johnson
McBain
River
Ruggles
Schapiro
Wallach
Brooks
49 Claremont
Hewitt
New Barnard Dorm
Reid

Columbia Private Service-(CPS)

If you live in one of the suites in a dormitory where a phone is shared, you will have the option of having your own private RolmPhone connected in your room. You will already have Columbia Student Service in the common area kitchen or hallway of the suite. If you would like to have your own line connected in your individual room, then you may find Columbia Private Service an additional and/or alternative choice available to you at a competitive cost. The dorms in which CPS will be available include

East Campus
Hogan
Plimpton
600 W 116
616 W 116
620 W 116

PhoneMail- It's No Answering Machine

PhoneMail is the ultimate in electronic messaging systems. No longer will active schedules, time-zone differences, or busy RolmPhone lines prevent you from knowing that someone has important news for you. Instead, you will be able to

A. Have your phone answered by a pleasing, friendly voice

B. Listen to messages even if one is away from one's room by dialing one's password

C. Call forward busy calls into one's voice mailbox

D. Choose to listen and delete messages after they have been listened to and played

E. Provide return receipts to message senders indicating whether or not messages were received (only to other PhoneMail subscribers)

F. Reply to messages sent intra-campus without making a separate callback to the sender

G. Forward a received message to another student - even add comments to that if you like

H. Skip over a message you don't need to hear

I. Transfer out of PhoneMail to another extension

J. Change your password at anytime

Your family and friends calling in will also have options such as being able to

A. Leave a message and hang up -- the caller not needing to know much about PhoneMail

B. Camp-on to your extension even after calling you and being forwarded to your PhoneMail box (internal calls only)

C. Reach the PhoneMail system directly via the guest access number, which is dialed directly, and leave a message for you

There are four ways that your PhoneMail box can be reached:

1. Dial in directly
2. Be system forwarded
3. Be transferred from someone else's extension
4. Be reached by guest access

You will receive three messages as part of the basic service. In suite situations, where the central phone is used by all of the residents, the number of messages allowed is three times the number of students in the suite. For example, if five people share a suite in Plimpton, they will be allowed 15 messages with CSS.

Dormitory Data Services

- Do you own a microcomputer or terminal? Do you currently have a modem? Are you thinking about getting one?

- Would you like to send electronic mail to other students? To your professors? To people you know at other universities in the U.S. and abroad?

- Do you use CLIO (Columbia's electronic library card catalogue) or our other academic computing systems, and would you like to be able to do so from your own dorm room?

Beginning in January 1989, Columbia's new Dormitory Data Services option will be available for all dormitory RolmPhones. For $50 a semester (with NO extra installation charge), you will be able to add the DATA feature to your CSS (Columbia Student Service) or CPS (Columbia Private Service) RolmPhone. You can also get a DATA-only CPS hookup for $75 per semester.

Uses of the DATA feature

CLIO: Convenient access to Columbia Libraries Information Online from your room. You don't even have to get dressed and leave your room to come up with that last-minute citation!

CUCCA, etc.: Fast access (19,200 baud) to all Computer Center academic systems and many other departmental computers. Do your homework from your room instead of having to use one of those crowded terminal rooms. For $25 a semester, CSS/CPS DATA customers can also get a CUCCA user ID (a savings of $10 over the usual price). Use it to do your computer homework, send electronic mail write papers and print them on laser printers, learn UNIX and addit to your resume, solve Calc problems, and more. Call a CUCCA consultant at 280-3631 or visit 215 1AB or 251 Mudd to find out more about our computer systems.

Dial-Out: If you have ACUS (AT&T College & University Systems - see information below) off-campus service on your phone then you can call data services like Compuserve and the Dorsai Embassy at 300, 1200 and 2400 baud. In the near future, when 9600 baud (and faster) modems become popular, they will become available as well at no additional charge to you. If you use a modem from your dorm now and will be getting CPS or CSS, you will need the data feature since direct-connect modems don't work with RolmPhones.

PC to PC and Dial-In: Intra-campus data calls at speeds up to 19,200 baud may be made between any two DATA users. You can exchange data (using Kermit, for example) with your friends who also have the data feature. Set up Fidonet's, PC bboards, etc. If you want, you can set up your PC to be called by people off campus, using the shared inbound modem pool at 300, 1200, and 2400 baud with 9600 baud coming soon.

FINE PRINT (or what you need besides the DATA feature):

- a terminal or personal computer with an asynchronous RS-232 communications adapter (a standard feature of most modern PC's). The PC will also need some sort of terminal emulation software like Kermit (which is free to Columbia students and faculty).

- an RS-232 modem cable to connect the PC or terminal to the RolmPhone data jack. If you have one with a DB25 connector for your modem now, it will probably work.

- a spare power outlet in your room for the RolmPhone Data Communications Module power supply.

New York Telephone Centrex Service

Two dormitories will remain on the 280-Centrex system. These "off-campus" dormitories could only have been connected through the new switch by digging a separate trench in order to lay the cables for the IBM system. In each case, there were too few phones located in those buildings to justify the cost of digging a separate trench and/or there was no other building which would have been cabled through that trench. At

this time, to accomplish this would have been fi-
nancially prohibitive. The two dorms are

Fairholm
601 W 110

Connection to these dormitories will be
made by dialing a tie line to or from the other
campus extensions. For example, today we dial
Teachers College by prefacing the four digit
extension there with "94" and they reach the
Columbia main campus by prefacing extensions
here with "71." The same type of access code
will be dialed to reach Fairholm and 601 W 110
in the spring semester. All calls between these
two dormitories and the main system will con-
tinue to be made without incurring local message
unit charges.

New York Telephone Private Service -An Option?

Yes, in most cases, contracting with New
York Telephone for a private line is an option
wherever Columbia Student Service and Colum-
bia Private Service is offered. (The two excep-
tions to this are Schapiro and the New Barnard
Dormitory.) But, with all options, you need to
determine which one will give you more for your
money and at the highest quality service pos-
sible.

Please note that Carleton Arms, Wood-
bridge and Watt will not be on the Columbia
system in January 1989 just as today they are not
on the Centrex system. In these three dormitory
residences, New York Telephone Private Service
is the only service available.

New York Telephone - Any Advantage?

Not many. First, there is the deposit
which is required for first time customers of
New York Telephone. In the 1987-88 academic

year, that was $75 alone! Also, each academic
year all customers are required to pay an installa-
tion charge. That includes a $15.50 service
charge, and a $37.20 central office line charge.
No jack in your room? Add on an estimated
time and material charge of over $107. Look at
this, again. You pay the following:

$75.00	Deposit (if you don't already contract with NYT)
15.50	Service Charge
37.20	Central Office Line Charge
107.54	Time & Materials Charge (if no jack is in place)

$235.24	Taxes and Surcharges not included!

The time and material charge can be even
more, depending on what extra wiring or time
may be necessary to finish the installation! To
opt to have New York Telephone service, even if
you've already paid a deposit and have a jack in
place in your room will cost you at least $52.70
not including taxes and surcharges.

Then you must consider that you will be
incurring local message unit charges just to call a
friend on campus or to reach the gym the regis-
trar or any other administrative office. And
don't forget, any features that you get with New
York Telephone you will also pay for on a
monthly basis.

The basic cost for monthly service with
New York Telephone for "untimed" message
units (that is, the cost of each local call is "x"
cents no matter how long you talk) for a student
who has a private phone is presently about $14.
For that amount, what you get is rather basic --
no phone and no features.

Can We Talk?-More Economically?

Fortunately, yes! You can talk economically by contracting with Columbia Telecommunications Service. With either Columbia Student Service (CSS) or Columbia Private Service (CPS) voice and/or data packages, you'll be amazed at all you will get for the price. Take a look at the semestral and annual rate for the various packages offered:

Rates	CSS Voice Only	CSS Voice /Data	CPS Voice Only	CPS Voice /Data	CPS Data Only
Semester	$0	$ 50	$ 75	$125	$ 75
Yearly	$0	$100	$150	$250	$150

These rates are based on a total academic year billing of eight equal amounts. Averaged by month, the voice and data Columbia Student Service package will cost just over $12. In fact, the package which has the most expensive monthly average cost, Columbia Private Service with voice and data capability, is just over $30!

Compare these prices with those of N Y Telephone. The price of a new installation alone pays for a full academic year of service, excluding local and long distance calls, for all voice only and combination packages, except one.

The best thing, however, about the Columbia Telecomm System prices is that the there is no installation charge! This is true for all packages of the Student and Private Services.

Can't talk right now? - PhoneMail Can!

If you can't talk then it's PhoneMail to the rescue! The schedule of pricing is

3 messages	$00.00 (part of voice packages)
8 messages	$15.00/semester
15 messages	$25.00/semester

PhoneMail will be billed on a one-time basis at the beginning of each semester.

AT&T College & University Systems - ACUS

AT&T has been providing long distance service for longer than any other company. Offering the best value, AT&T is a perfect complementary service to our telecommunications system. Now, AT&T has gone a step further, by creating a separate division to handle college and university systems with the special services and needs for a campus of any size. Included in these services will be billing and collection. We are pleased to announce that ACUS is the company of choice to provide you with a variety of services included in the package offered.

1. Superb Transmission Quality

You may have found with other long distance companies that they "will" offer better transmission, or "intend" to have better connectivity." With AT&T, this will not be a problem. Any trouble you may have making long distance calls is handled quickly and courteously.

2. Best Rates Possible

You cannot find any better rates than AT&T has to offer. By dialing direct, you save substantially over making a credit card, or any operator-assisted call. Multiply rates by service at AT&T, and you always end up with $avings.

3. International Calling - A Plus!

You don't have to be an international student at Columbia to enjoy International Dialing at AT&T. You'll make calls outside of the country just as easily as you do within.

4. Accurate Bill Processing

You may never have to think of the

elements in a competent billing system because accuracy, timely payment processing, and easy to understand bills are some things you can count on with AT&T. And you will receive individual bills which reflect your Personal Security Code usage. You can even have your bill sent to your dormitory or permanent address.

5. Dependable Customer Service

Will you expect professional, courteous, knowledgeable, and problem-solving customer service with your long distance company? We think so and that is exactly what you'll receive.

6. Convenient Sign-Up

You will receive information about signing up for the AT&T College and University Systems during the summer if you will be living

in Schapiro and Barnard's new dorm. In September your long distance service will begin working when you do. Those in other dorms will be informed later in the year.

Don't Delay, Sign-Up Today

Now is a good time to think ahead and select Columbia University Telecommunications System for service. Please fill out the form below and return it by October 3, 1988. (The next opportunity may not be until the Fall '89 semester.) A contract will be sent to your dorm address. (Schapiro and new Barnard dorm residents will receive one by the summer's end.)

If you have any questions about enrollment, please contact by mail Karl Pettus, Student Services Coordinator, Office of Telecommunications, CMR Box 185, or call extension 2323.

Preliminary Student Telecommunications Agreement

Yes! I agree to contract for the Columbia University Telecommunications System for the Spring of 1989 service.

Name _____ Student ID # _____
_____ _____ _____
Last   First   Middle Initial

Fall '88 Address_____ Fall '88 Phone Number_____
_____ _____
Room #   Dormitory

Home Address_____
_____ _____ _____
Local Address   Apt. #

_____
City   State   Zip Code

Will you need Columbia Private Service? Yes_____ No_____
Will you want PhoneMail? Yes_____ No_____ How many messages? 3_____ 8_____ 15_____

Signature_____ Date_____

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8 - TeleComunity NewsLetter

I can not tell you enough the importance of providing as much information to your user community as possible. About six months into the Columbia Project (after the contract was signed) we developed a newsletter that was to be used for communicating to the Telecommunications Coordinators. We called it the TeleCommunity Newsletter. I would strongly advise that you develop some type of Newsletter for your Project and that you do it as early in the Project as you can. I felt that waiting for six months into the project was too long and that having the newsletter earlier would have been very helpful. As we went to press, we did not have a preset publication schedule, but rather, issued the newsletter on an as needed bases. All members of both installation teams, the University and Vendor, were encouraged to provide articles of interest to the user community as the installation progressed.

In addition to issuing the newsletter to the TC's, we provided each TC a special three ring binder at the beginning of the Project to keep all Project related information in. The binder was specially prepared for the TC's with a special identifying cover. The purpose of this was to try and bring the TC's into the Project on a more active bases and make them feel part of the team. The binder helped dictate the format of the newsletter which was 8 1/2 by 11 and three hole punched for ease of storing.

The same TeleCommunity Newsletter format was used for providing information to the student population. Since we were planning on completely rewiring the dorms and providing full telecommunications services to the students, it was imperative to effectively communicate to them about was going on.

Setting up a professionally published newsletter that not only provides meaningful and accurate information, but also looks good is not easy. We used a combination of an Apple Mac SE, Apple Laserwriter and all kinds of software for formatting, editing and printing. Furthermore, at the beginning it took almost the full time effort of a technical writer to get together each issue we published. In order to add to the quality of the newsletter we used a good bond and weight paper and used offset reproduction as opposed to xerox.

One more idea that will add to the value and help get the newsletter read, include pictures. Pictures of the new station equipment, the installation of the cable plant, your switch room, articles about the staff doing the installation with a picture of them, anything to help provide a visual image of the project. Adding a black and white picture is easy and does not up the cost of the newsletter to any significant degree.

Accuracy in your Newsletter is of utmost importance. Ask your vendor to review your articles that address technical aspects of the system to make sure you are correctly reflecting what you believe to be true. As you will learn, what you believe to be true and what is are not always the same thing. You will also want to check your vendor's documentation for the same reasons.

Over the course of the Project, if used creatively and given wide enough distribution, the Newsletter should more than pay for itself. The Project Newsletter may even form the basis for an ongoing publication after your new system cuts over. We continued to publish the TeleCommunity Newsletter after the official cut over on a more regular basis to help introduce new features, advertise and communicate what the Telecommunications Department was up to and what new policies were being developed.

COLUMBIA

UNIVERSITY

TELECOMMUNICATIONS
COORDINATOR
MANUAL

- *Instructions*
  - *Installation*
    - *Implementation*

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an IBM company

ORGANIZATIONAL SUPPORTED PUBLICATIONS

Besides the Newsletter you develop for the Project, you should consider what other sources of information distribution you have available to you. Is there an organizational newspaper or newsletter that goes out to all employees? Do you send out a monthly telecommunications bill now that you can stuff flyers into? Try and utilize these sources for distributing information that may be of general interest to your entire user community.

STUDENT SUPPORTED PUBLICATIONS

Often times in Universities the students have their own student run newspaper. The chapter on DORMS and STUDENTS describes what may happen when you are interviewed or if the student newspaper is not on your side. However, you maybe able to turn this student run newspaper to an advantage by placing ads and writing articles describing what is being done and explaining the advantages of the new System. The student newspaper may not run your articles but they certainly will accept your paid advertising.

SLIDE PRESENTATIONS

There is no substitute for getting out and talking to the user community. One thing I did was to get together a slide presentation that took the Project from its inception all the way to the installation process and the pricing schedule. I used this presentation when talking to Deans and Chairmen who wanted more information on what the Telecommunications Project was all about. I also prepared several open sessions on the campus for walk ins to see the presentation and learn about the Project.

In a large complex organization, one of the most difficult things to do is keep everyone informed and up to date. I know it was work just to keep all of my staff and that of the vendor up to date and coordinated. Keeping the user community informed and involved is even more difficult. The more and better informed your user community is, the better and smoother the entire installation will go and the better chance you have of getting a higher turn out for end user training.

NEW EMPLOYEES

When you have completed all of your training plans and materials, do not forget to plan on indoctrinating newly hired staff. If your organization has a formal process for orienting new employees to your company, you should coordinate with this process to have your training material included. Again, depending on the size and importance of telecommunications to your company, you may even consider scheduling a regular monthly training session for new employees and/or those that need a refresher on the basics or help with the advanced features.

In any case, training does not end with the end of the formal training sessions scheduled at cut over. It takes time for a new system to be fully utilized and understood by a large organization. For your system to be truly successful, you will need to continue training and education of your users and help them to improve their job functions by the utilization of the advance features of your new Telecommunications System for years to come.

Chapter 10.

DORMITORIES AND STUDENTS

Universities have a very unique user population in students. This is especially true if they are residents of the campus and not just commuters. The logic and methods used to deal with the general University staff just do not work with a young and vocal student body who live on the campus rather then just work there. This was especially true at Columbia. Columbia is well known as a place where, as many would say, student activities on international and national issues often start, or at the very least, receive extensive media attention. This same enthusiasm often finds its way into the pursuit of on campus activities. I am sure however, that our student population and their reactions to our Telecommunications System installation are not unique to Columbia.

Here is an example of what I am talking about. During the early years of the project there was a great deal of activity and discussion in the country on the subject o investments in South Africa. To the best of my knowledge, the very first Universit Campus that had student demonstrations on this subject was at Columbia. The demonstration took the form of a lockout of administrative personnel by the students of one of the administration buildings. Although we never discovered the culprits, the first item that was damaged in the building taken over by the students was a communications cable in the basement.

THE STUDENT NEWSPAPER

One interesting relationship that I developed with the students was with the student-run newspaper, *The Spectator*. The students run their newspaper the same way the big boys do, that is they generally report on news that is bad or not favorable to the University and are light on the good news. The Telecommunications Project provided much news from the students view of things. The student reporters were not shy. Several times I would receive calls at home on weekends and evenings (sometimes quite late with the excuse being "I have a deadline to meet"). The calls at home were a problem for two reasons;

First - Calls at home were mostly because of a late breaking item or event which I may not have been aware of, or have sufficient information on hand to answer intelligently. On one such occasion I was called late on a Sunday night because a student reporter had a friend at SUNY-Stony Brook who complained about a few quirks in the system. The reporter wanted to know if we had the same problems. I knew nothing of

the problems at Stony Brook and informed the reporter that I did not have enough information to respond to his inquiry. I offered to get details if he could wait till Monday. No, he had a deadline and that was the end of the conversation.

The next day I was quoted in the paper as "refusing to comment on the situation at Stony Brook". Talk about editorial liberties! It ended up that Stony Brook had a trunking problem with their local Telco and the system was giving a fast busy because of unavailable trunks. Once the problem was recognized it was fixed.

Second - I developed a firm and deliberate policy, "no interviews were to be given on the telephone." This worked out a lot better then I had expected. Generally, a face-to-face interview allowed me to more fully explain the many details of what would appear to be a simple question asked by the student reporter. They often learned a lot more then they bargained for. The face-to-face meetings did at times result in many more follow up questions. Although, this face to face policy did not always guarantee fair and accurate reporting, the chances were better this way.

The quality of the student reporters varied quite a bit. Some were very knowledge-able about telecommunications, while others barely knew how to answer a telephone. During the four years of the TeleProject, I was never interviewed by the same student reporter more then twice, hence they never really developed a base or understanding of the Project. Further, I do not believe that they really cared to understand it, they just wanted to report on it.

The details noted above directed me to yet another policy I used with the student reporters. I would always try and direct them to the body of information already available so that they did not spend a lot of time rehashing items already well docu-mented or questions asked and answered. I would ask them to reference the Dormitory Newsletter we had issued that already had a wealth of information in it and stories already published. Most times this advice would go unheeded and we would repeat and rehash old items anyway. This was typical of the student-run newspapers. Surprisingly, the above not withstanding, every once in a while a factual and fair story was run. On these occasions I had always made a point of calling or writing the reporter and thanking them for getting the facts straight, even if the story was not favorable.

One of my best stories from my experience with the student newspapers has to do with word of mouth and "absolutely reliable sources of information." One day in early 1988 a student reporter comes crashing into the Telecommunications offices demand-ing to see me. I agreed to talk with the reporter for a few minutes. Her first question to me was, "what's wrong with the system?" I informed her I had no idea what she was talking about. She insisted that she had it from a reliable source that the new telecom-munications system had been delivered and that we could not get it to work.

I found this somewhat surprising since we had not yet taken delivery of even a phone at that point, never mind the system itself. I explained that the new telecom-munications system was still in the vendor's manufacturing plant, very likely in many thousands of pieces and was not scheduled to arrive for some months. She then proceeded to ask me if I was sure, that her source of information was absolutely reliable. I strongly suggested that she check out her very reliable source and that I was sure that the system had not yet been delivered. As this young lady reporter left, I felt that she was not satisfied that the system still did not work as her source had told her.

The accompanying article is an example of when a student reporter got most of the facts straight. They always seemed to have to place a few zingers in at the end of a story no matter what.

INSTALLATION IN THE DORMS:

We thought we had taken great pains in making sure that the students needs and requirements were taken into consideration during the installation process. And in fact we did. However, there were problems and situations that we just did not foresee or our vendor did not or could not understand. Read and take heed.

Getting several thousand phones installed during the summer months "when no one is in the rooms" is often a myth. Just getting access to the individual dorm rooms ended up to be a nightmare. Our vendor had planned to go around knocking on doors and run around the place while performing the cable installation and subsequent station installation. We had also anticipated on negotiating and receiving the master keys from our Residence Halls staff and have their staff work with us for dorm room access. We were wrong on both counts.

The Residence Halls staff informed us quite vigorously that they had no staff to spare for what would amount to months at a time to work with us on secured access to the student dorm rooms. This was made even more complicated by the fact that if we even wanted to pay for the Residence Halls staff, they were not available for the times we would need them and for the length of time needed. Their staff had other assignments that took precedent over our work. Namely, their jobs.

When it comes down to it, we should have coordinated the plans more closely and effectively with the dorm folks. Knowing the facts as they are now, it was not a reasonable expectation that the needed staff would be available to the extent we would have required them.

Another issue that came to the forefront was getting access to the master keys for entry to unoccupied student rooms. There were numerous problems with this issue also. The main one was, who was going to be responsible for damage or theft claims made by students if the vendor installation team were admitted without University direct supervision? Our vendor rightly noted if they took full responsibility for this method of installation that this was in essence a blank check issued to the students for claims of theft. Not a check they were willing to issue.

With some hindsight, we should have seen these problems during the RFP stage and made allowance for them in our budgeting and planning with Residence Halls staff. We did not and hope that you will. I have been told that our situation was somewhat unique to New York City and the independent nature of the dorms and hundreds of unique keys. How did we eventually solve the problem?

Since the Residence Halls staff felt they were responsible for who they gave master keys out to, a reasonable position, we arranged for them to hire brand new staff to act as "key access personnel." These new staff members were dedicated to providing secured access to the dorm rooms. For the most part these were students who were hired by our Residence Halls department to make sure that no problems arose with our having master key access to all the dorm rooms. However, we had to hire at least one full time person for almost the entire project just to keep tabs on the student workers. This full time person was also needed to be around for emergency access or

for when other staff did not show up for scheduled work. Remember, you have your vendor's installation crews ready for work whether or not you have staff to let them into the dorm rooms.

In some cases, when students were not available or we had insufficient help, we had to hire Rent-A-Cop type people to fill in to help with access. This was not a very satisfactory way of handling the problem. The Rent-A-Cop type staff were not trained in what we wanted them to do nor were they familiar with the campus. At times we received complaints that they hassled the students unnecessarily. Plus, we never saw the same Rent-A-Cop twice. I would avoid using this type of temporary help even if it means a delay in the Project.

We attempted to schedule installation and access during the most unused times of the dorms. We anticipated that this would be during the summer months and term breaks. But these "slow" periods (it ended up that there was no such thing, students of one kind or another were always in the dorms) were not sufficient to do all the installation work necessary. Almost all of the 25 dormitory buildings were occupied all the time with only some short intervals in between. We finally resigned ourselves to the fact that most of the installation work would have to be done around the student occupied dorm rooms. This did not thrill us or the student population.

We worked out a detailed installation schedule with our vendor and Residence Halls for each of the dormitory buildings. The actual installation dates had very little to do with the planned schedule. We attempted to set up signs in the buildings where we were going to be working to give warning to the students. Several things happened with these signs: the students did not read them, although we were assured that the signs were up, students constantly informed us that they saw no signs, we missed the dates noted and/or it took longer to go through a building then we planned. As with any installation, the planned installation routes changed on the fly as new obstacles were encountered.

With all of the detailed planning we did, we never really consulted with the students to discuss the installation process and the ramifications of what we were doing. This lack of consultation was a recurring question during the installation and well afterwards, "why were the students not asked for their opinion?" In fact, we thought we were acting in their best interest and had the problems well in hand. Even though, if I had to do it over again, I would have worked more with some of the students and the student organizations more closely. I do not know if consulting with the students would have had a material affect on anything accept that the student complaints may have been fewer. But then again, they may have come up with solutions to some of our problems that we did not see.

All in all, the installation in the dorms went much better then it could have. There were few complaints of theft and rudeness on the part of the installers. Remember the "no second chance rule" from an earlier chapter.

SOME THINGS WE LEARNED DURING THE DORM INSTALLATION:

If you want to keep on the good side of the students and keep their cooperation, you must keep a close eye on the school calendar.

- No work should be scheduled the week or two prior to finals and mid terms or during the actual weeks of these two events. Remember that the installation process is dirty, noisy and disruptive and that the students really do need the time to study and do the required work for these tests. Its better that you recognize this as an installation constraint then have the students or the Deans tell you.

- Another period of time you need to be aware of is the scheduled time when the students are moving in and out of the dorms. You really can not get any work done while there are hundreds of students trying to use the elevators and moving boxes, computers and trunks of clothes all over the place. Get your installation materials out of the way and let the havoc begin. Giving the students some time to settle in after this traumatic event is also advisable. I would work very closely with my Residence Halls staff and the student leaders.

Another factor you need to keep in mind, your students live in the dorms. This may seem like an obvious fact. However, your contractor who may start doing noisy installation work at 8am. or earlier when working in your administrative or academic buildings will not face the same audience in the dorms. At 8am. many of your students are still sleeping and will not be happy about the disturbance. I suggest that you plan the hours of work ahead of time for the dorms and for the rest of the buildings on the campus. If it is necessary to start work in dorm buildings at an early hour, when making the postings alerting the students of the impending work, note the hours.

As you can see, there really is not as much time available to do an installation in the dorms as you may have thought. All of the situations noted above for the cable installation also goes for the station placement. Station placement has another problem associated with it. When you plug the station in for the first time it does not always work. You need to plan on time and schedules for trouble shooting dead lines as they are installed. Again, no trivial matter.

STATIONS VERSUS JACKS:

We took what we think was a unique position on wiring the dorms. Generally there are several types of dorm rooms:

- one room, one student, one phone
- one room, several students, one phone

In the types of dorm setup described above we generally just replaced the one Centrex line with a new dual jack and University supplied telephone. The students were in one room and could easily share the installed stations. Having the ability to have a data/voice station which did not cut off voice service while one student used the phone for data was also a great advantage.

However, when it came to wiring up the suites, generally defined as several students in their own rooms sharing a common phone in a common area, often a kitchen or sitting room, we took quite another tactic. In suites, we did replace the common phone with another common phone and jack as part of the new system, but we took the extra step of placing jacks in each of the individual student's rooms as well. These were wired like all the other jacks in the installation, but did not have phones attached to them. This gave us the capability to provide private service for these students in the suites, if they so wished. See the accompanying figure for a typical floor layout for a suite and the placement of phones and jacks for future growth.

The above jack placement policy added to our originally planned number of installed jacks because the policy was decided after the contract was signed. However, we believe that in the long term it was right decision.

Where do you place the new jack? You can not place it where your current Telco has it's jack unless you are willing to move it and have the Telcos blessing to do so. You can leave the decision to your Residence Halls staff if they are willing to take the responsibility. They have a better idea of the layouts of the dorm rooms then you do. They should, they bought the furniture for them.

We had two major problems with locations in the dorms:

- If the original phone was wall mounted, the new phone had to be wall mounted also because there was no table or stand to place any other kind of phone on. Finding sufficient space on walls to have both phones installed and operational for the parallel service we provided was a great pain. Further complication in the installation of the wall mounted phones was the fact that we needed to be able to remove them when requested, to be replaced by data/voice units when contracted for by the students. I do not care what anyone tells you, removing a wall mounted phone is not easy. The several times I tried I broke the wall mounts which needed to be replaced. The complication here has one more level. The integrated voice/data phones have their RS232 interface and LED lights on the back of the phone. This makes it a little bit more difficult to use a wall mounted phone for data. In addition, our vendor's data capability required us to supply power to the phone. Wall mounted phones were not always located in close proximity to power outlets. A desk phone can be moved a bit, a wall phone is quite stationary.

- The second jack location issue is one you can control more easily. Remember, jacks installed at bed height get knocked off the wall, and not all beds are made of equal height. Forget the 12 to 18 inches up off the floor stuff in the dorms. Get the jacks installed as close to the floor as you can and avoid them getting knocked off by beds and desks and chairs. Better yet, if they can be recessed into the wall, that's the best alternative of all.

THE STUDENT FACTOR:

You never know what is going to get in your way. At the beginning of the Project we had a master installation schedule. This was what you might expect it to be, a building by building plan. However, as noted above, we did not take things like finals and midterms into consideration which through the schedule off. Another activity I did not count on was regular disruption on the campus caused by the students' need to voice their dissatisfaction with the University or national policies.

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(while you still can)

Call Collect -
Call Often -
Call Every Chance You Get!

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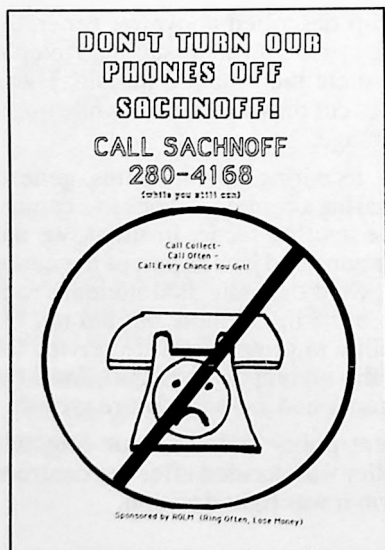
One example of this was when the University closed down a building we were working in. It seemed that the University Trustees were going to have one of their regular monthly meetings in the building we were wiring at that particular time. A group of students had decided that a particular issue being considered that day by the Trustee was of interest to them. For the life of me I can not remember what the issue was. In any case, to make sure the building was secure and that the Trustees would not be bothered or interrupted, the building was, with no notice, closed for the day and all work stopped. Three installation crews were sent home, with pay.

Voice messaging was installed as part of the basic telecommunications package provided to students in the dorms. When turning on Phonemail we set the default password on for all the 3,900 dorm phones. We ran into two immediate problems with passwords. In suites were there was more then one student to a phone, one of the students would get into the shared Phonemail box and change the default password as we had instructed them to do. The problems came when one of the roommates changed the default password and did not or, refused to tell, the other students in the suite what the new password was. In most cases the students in suites worked this problem out themselves.

The other problem was with students trying to make hay with the system. Some students would break into the Phonemail boxes of other students who had not changed their passwords yet and change it for them. I guess they thought it was funny. I only wish we had an easy way to have tracked these students who abused the system. We did not have that capability and lived with these problems as best we could. To protect ourselves and the students, we devised a form that a student had to fill out prior to our resetting any of the passwords. The student had to come to our offices, fill out the form and sign it. This worked out fairly well and the number of abuses dropped dramatically.

I call these examples, "The Student Factor." Much credit must be given to Columbia for this. We allow, and sometimes encourage, a significant amount of student activity on national and local issues. It is part of the growing up and education of the students. Columbia has a rich history in this area. Do you remember the 60's and the students hanging out the windows?

Providing student services and hence the wiring of the dorms will not be a universal trait for all Universities installing a new telecommunications system. But if you do, be prepared to deal with the very different user community. This chapter should help.

Chapter 11.

CUTOVER

Cutover is a common term used in the telecommunications industry to describe the actual implementation or the physical changing of lines from one system to another, turning on if you will, of a new telecommunications system. Cutover often occurs at the same time with the termination of the old telecommunications system, but not always. This event is generally the result of the culmination of months or, in our case, years of work installing the entire system. The specific definition we used at Columbia for this event was as follows:

> CUTOVER - occurs when you can receive telephone calls from both the outside your company and from intra- company telephones and, can make calls both intra- company and to outside your company and be billed for the calls made to the outside world all on the newly installed telecommunications system.

Not all companies would define cutover quite the same way. Your contractual definition for cutover may be different than the technical event. However, in general, the above definition will suffice.

CUTOVER OPTIONS

Defining cutover does not necessarily define how you reach that goal. There are several options available as to how you can cutover your system, each one has its own advantages and disadvantages:

FLASH CUT:

A "Flash Cut" is generally defined as the simultaneous activation of the new telecommunications systems and deactivation of the old. Often times in instances where you either reuse your existing cable plant, CO trunks or stations, this is the only possible alternative to cutover to the new system.

At Columbia, although we installed a new cable plant, CO lines and stations, we could have terminated all our Centrex service from NY Telephone at the same time we made the new telecommunications system fully active. This would have been in affect a Flash Cut.

By cutting off the old Centrex service at the same time as we cut over CTS we would have realized some financial savings. We would realize savings because by having a flash cut we would by paying for only one system at a given time. This financial benefit is not always obvious or clear to the uninitiated.

You are usually paying something for your current telecommunications service, whether it be service charges to your local Telco or debt service for a loan. A flash cut will most often keep you from paying for two telecommunications system at the same time. Generally when you cut off service from your current telecommunications service you also stop paying for it. Often, at the same time, cutover is synonymous with the start of both the warranty period and the repayment of the loan or debt service for the new telecommunications system. Depending on what your monthly costs are, having both systems up and running at the same time could be a significant sum of money.

What are the disadvantages of a flash cutover?

- What if your new system does not work as planned? As strange as this notion may be to your vendor, the chances are high that the actual performance and planned performance will not be the same.

- With a flash cut it is generally very difficult and expensive to go back to the telecommunications system you had before. Sometimes it is even impossible to go back to your previous system, especially if you cut or removed the old cables to serve your new system. You wind up in a panic mode of operation and getting it fixed and running at almost any cost becomes the word of the day.

Since we had installed a totally new cable plant, new Central Office trunking and new stations, we had other options available.

PHASED IN CUTOVER:

A "Phased In Cutover" can generally be defined as the systematic removal/disconnection of the old system while the new system is systematically turned on, at any given time during the phased in cutover, various sections of both telecommunications systems are active.

This phased in cutover option received much discussion. On the surface it seemed to make sense to phase in the new service and systematically phase out the old at the same time. However, when you go to look at the details of a phased in implementation, the actual problems start to multiply. We had over 75 buildings to cutover and thousands of individuals to coordinate with. It became clear that the logistics of even a phased-in cutting over by building would be difficult for us to handle. The principle problems were:

- 1) Staff members on the campus would not know which phone system or phone number to call other staff on during the phased in period, Keep in mind that we had thousands of stations to install and check and that this process, in the best of circumstances, would take several months.

- 2) Although our local telephone company was more than willing to coordinate the phase out of the old service with us, after the fact it would have taken months to straighten out what lines were terminated when. Working with our local Telco and their accounting/billing functions was a challenge even in the best of circumstances, to have worked out these details would have been a tremendous effort.

- 3) How would we have managed the new number call intercept with our local Telco announcing the new exchange to outside callers as we phased in the system? Having calls forwarded to the correct party and telephone line from the outside world would have become an almost impossible task. There is almost nothing worse then having a new telephone number that no one can reach.

My first view to these issues was that they were management problems and hence could be managed with some thought and cooperation. The actual attempted planning proved out otherwise. The available data bases for the current service could not be relied upon to accurately reflect the location of the new numbers verses the old. The coordination effort with the departments and our local Telco would have taken many

more resources then were available. Plus, the phasing in of the Telco call intercept announcing the new exchanges would have never worked properly, or at least not well enough to satisfy many of the University staff.

Like the Flash Cut noted above, a phased in cutover does provide for a financial advantage. Since you are terminating your old service as the new is being installed, although there may be some overlap, you are basically paying for only one system at any given period in time. In a situation where staffs extensions and your exchange are not being affected and you have easily identifiable communities of interest, a phased in approach may very well be the ideal cutover method.

PARALLEL SERVICE OF OLD AND NEW:

The easiest, (although not so easy by any means) safest and surest way to cutover a new telecommunications system is to operate both the new and old systems in parallel for a specified period of time. Parallel service of the old and new systems, although the most expensive of all the options, is the least painful way to affect a cutover.

The chief advantage of a parallel cutover is the safety of having your old system still in place while your new system is being brought on line. If for any reason your new system has a problem or does not perform the way you expected it, you still have a fully functional telecommunications system in place as an immediately available back up.

Overall, Columbia took a very conservative approach to cutting over the new telecommunications system.

The University selected the parallel service approach for its cutover. Although this method was calculated to be significantly more expensive then either of the two options noted above, (we were virtually paying for two complete telecommunications systems during the period of parallel service) the long term impact and full success of the Telecommunications Project was felt to be based in how successful the cutover period and perception actually was. We also considered that with a large part of our user community consisting of over 6,000 students, we felt we could not afford interruption of their service at almost any expense.

A parallel cutover does not go without its disadvantages. For a period of up to 8 months, there were users who had two telephones on their desks. Consider the following; it took from May 1988 to just before September 1st, 1988, cutover day, to install the 10,000 or so new stations, the very first people to have the new stations installed would have had two stations on their desk for at least four months prior to the official cutover date. Now add to that the time we ran the two systems in parallel for the entire university, September 1st through December 23, 1988 and you have users with two phones on their desks for up to eight months. There are several problems with having two phones on your desk at the same time, not the least of which is the space they take.

We wanted our users to be able to start using the new system as soon as possible so that they would get use to it. To help encourage this we designed the system to allow for incoming service on the new exchange for those areas with the stations installed prior to the official September cutover date. The net affect of this was to sometimes have two phones on your desk ringing at the same time. Most staff understood the situation and why we were operating with parallel service. These users correctly arranged for their callers to use the new exchange only and virtually abandoned the old

system. Others could not cope with the dual system and asked to have the new service cut off until such time that there was only one system to deal with. They missed the point entirely.

Another problem (risk) of having two phones on your users desk at the same time are those staff who refuse to use the new system until they absolutely have to. We discovered telephones in closets, desk draws, under desks and in paper bags. Some staff would go to any extent not to have to deal with the new system until they absolutely had to. A previous chapter dealt with the training aspect this problem.

I had instructed my staff to only use the new telecommunications system when making calls around the campus and insisted that they call on the new exchanges. Many a time when placing a call on campus did a phone ring 15 to 20 rings prior to its being picked up. The two most often given excuses for not answering faster were; 1) I could not find the phone to answer it although I heard it ringing or 2) I don't know how to answer it. The most often heard comment was "this is the first call I have ever received on the new telecommunications system." Although this at times became discouraging, we did get a larger set of the user community to use the new system, if only because we were calling.

Overall, the parallel cutover was very successful and the best of the three alternatives for Columbia.

DATA CUTOVERS:

Columbia had been using a dedicated data switching system for over ten years prio to the PBX installation. Over the years the dedicated switching system had performed rather well and had many special features added to it that made it particularly endearing to our user community. However, after ten years and significant growth in the number of our data users and their needs, the old system was no longer serving us in the manner that we needed. If you are going to use your switch for switched data as we did, there are several items that need to be given special consideration.

A phased in or parallel cutover for the data side of the switch is much more difficult to attain than it is for the voice side. There are two primary considerations to be given for a data cutover:

1. Generally, there are a number of host computer systems from which to choose to connect to in a switched data system. Each host system has a finite set of host ports connected to it via the primary switching system. To perform a successful phased in or parallel cutover for data you would have to take or accept one of two actions:

A. Add a sufficient number of host ports to each computer system from each of the switching systems so as not to degrade access from either data switching devise during the cutover period. This action can be rather expensive since the need is only temporary. Further, host systems usually can only have a finite number if host ports connected to them. Or;

B. Accept the degraded service to your user community during this time frame. The degradation would take the form of running out of sufficient host ports on one system or the other locking out users from making a host port connection.

Option A is generally not acceptable for cost reasons where B is not acceptable because data users generally need to have access when they need it.

2. What holds true for host ports noted above also holds for your inbound and outbound modem pools. The available alternatives also remain about the same.

3. Data networks often require a different level of maintenance and expertise for their successful use then do voice networks. Maintaining both the old and new during the cutover stages may tax your staff and technical ability to maintain both networks.

4. A completely trouble free voice cutover is generally not the rule in a large, multi-thousand voice line system. It is much easier to trouble shoot data problems, or for that matter voice, when the voice side of the system has been installed and settled down. If you cutover both systems at the same time, it is sometimes not very clear where a problem lies during trouble shooting.

Because of the above items, we handled our data cutover much different then we did our voice, even though they both use the same switch and station instruments for their communications.

The official cutover for our switch was September 1, 1988, however, we did not cutover the data side until a two full months later. During the two months of the operational voice side of the system we attended to the following:

1. We spend a considerable amount of time checking and rechecking all the data parameters, features and host port connections. We used test ports and modems for making calls into and out of the switch from different types of terminals using different communications software. It turned out that not all software and hardware was as compatible as we had originally thought. You can read all about our specific data software and hardware issues and how we solved them in an excellent article written by Frank da Cruz and Christine Gianone of Columbia University in the Data Communications, October 1988 issue, pages 129-157.

2. We pre-installed all the new data cables needed for the new PBX to host port connections. This was done so that when we did do the data cutover, all we would need do is disconnect the old data host cables and reconnect the new ones.

3. Special classes and documents were prepared for all the data users who would be going to the new data switching system. The new PBX and the old data switch did not quite work in the same way. Many critical data users were personally visited and given instruction on how the new system would affect them.

During the weekend of November 4th, 1988, all the host data ports were switched from the old data switching system to the new PBX. The completely duplicated host port cables made it possible to move the 1,000 plus cables over a single weekend. When the University opened again on November 8th the entire switched data system was ready and active for use.

If given more time and resources, there were a few problems that occurred that we could have possibly prevented, but they were relatively minor. A few cables to the host ports had incorrect pin configurations installed and messed up some of the connections while some of the new cables were just bad. The same thing was true for the modem pool modems. We installed 200 modems in very short period of time. Some of the modems were defective when delivered while some of the cables were not good. The modems were a particularly hard problem to solve. The modem problems manifested themselves in different ways that made detection and trouble shooting both time consuming and difficult. In the meantime, our modem pool users suffered the problems.

Bad cables, incorrect pin configurations and bad modems can generally be discovered prior to the actual data cutover, but it takes resources. The time spent verifying these items prior to your data cutover will be time well spent and will contribute to the success of your switch cutover in general.

CENTRAL OFFICE (CO) TRUNKS AND THE PUBLIC NETWORK

An interesting set of problems has developed with the installation of the many new digital Central Office (CO) switches in the public networks. With the rush to get in on the digital band wagon, many Telephone Companies are installing digital CO's at a very fast rate in certain parts of the country. Along with the increase in digital CO's is the greater number of digital trunks getting installed to the end user premises. This is both good and bad.

The good points of these digital networks are better tariffed rates for the higher bandwidth trunks, more total bandwidth availability and, enhanced available features that may not have been available in the older network. However, there may be a downside to these digital systems and trunks if not installed and maintained properly.

- Digital CO trunks have added a totally new dimension to the technical skills needed to install, maintain and trouble shoot these new lines. The combination of new fiber networks, multiplexers and other new technical interfaces make it more difficult for the local telco to hire, train and dispatch the right technical personnel when problems arise. Many of the telcos are still learning about these problems and how to organize themselves to provide a higher level of service. This is important to you because a larger and larger share of your network is sometimes operating on fewer but more complicated and complex pieces of equipment. Even a small failure can be a major problem. Depending on your local telco and the type of service you use for the installation of your CO trunks, their technical capability to maintain your network may differ with what you have installed. You should investigate these issues with your telco to see how they handle CO type problems and if the staff assigned are actually trained for the new digital links you are using.

- The tolerances on the digital trunks will be measured differently then they are with analog trunks. As with analog service, you may have voice grade service trunks that you also use for dial up data services at relatively low speeds. These publicly switched data speeds using voice grade lines typically range from 300-2400 baud. The problems arise when the digital network is working appropriately, that is, within the tolerances for voice service without any interference or degradation of service but are not within the tolerances for slow speed data.

A critical test that you must make prior to your official cut over date is the testing of your inbound and outbound modem pools on your new digital trunks. You should test having calls made to the typical locations called and have calls made from the various areas that calls are made from. You are likely to find glitches, blips, noise and other problems with your networks that do not affect your voice systems but make your data switching capability useless for off-campus work.

Help and cooperation from your local telco on these problems is of the utmost importance. Hopefully you will have already discussed this issue with them and they have agreed to work with you on data related problems on their digital network. Keep in mind, if your voice side is not affected by the issues and problems noted above, they may be somewhat reluctant to try and fix anything that is not broken to their specifications.

In our case we were lucky to have a telco that was involved and interested in helping to solve our data related problems. Our technical problems turned out to be all over the place. Our original data related problems ranged from our having bad modems to the local telco needing to replace whole sections of their fiber network. All so that our data calls off the campus could successfully be handled. Unfortunately, the trouble shooting and time to repair took months to accomplish because the problems were so wide spread and difficult to find.

Many of our problems could have been fixed and discovered with earlier installation and testing of our data equipment. Since these problems tend to be more difficult to find and correct than your voice problems, you should plan and give yourself more time to work on them.

THE TROUBLE DESK:

To avoid any confusion as to where to call if a user had a problem or questions and to allow for a single point of contact and control, we established an official Trouble Desk. The Trouble Desk telephone number was established very early on in the Project so that it could be distributed in the user documentation. Without a central point of control for users to call, calls will be received all over the place, including your office. A Trouble Desk can either help or hinder the cutover process, just the establishment of one does not guarantee its success.

- No matter how much time and effort you have spent on training your user community, installing the right stations at the right locations and planning on having a trouble free cutover, your Trouble Desk will be inundated with calls. There will be nothing more frustrating then having your user community calling your trouble desk and getting a busy tone. If you are going to go through the effort to establish a Trouble Desk, there are two mandatory items that must be considered.

1. The desk must be sufficiently manned to allow most calls coming into it to be responded to by a person within a reasonable period of time. There are several ways to accomplish this task, each having its advantages and disadvantages. One alternative is to have sufficient staff to handle all the calls. If you have enough room, stations and staff, this approach goes a long way in eliminating user frustration and getting an immediate response to their problem. However, it may not be practical to staff the Trouble Desk for an extended period of time in this manner, it can get expensive. Another alternative is to use a call processing system to either direct callers to the right party or to a voice mail box to leave a message about a particular problem. If you are going to use call processing, you must make sure that the voice mail boxes are reviewed and responded to on a regular basis, otherwise, you will just generate more calls by frustrated users not able to reach a real person. A sample call processing routine may be developed as follows:

"Hello, you have called the XYZ Company Help Desk, if you are calling to report a service related problem with your telephone please press 1 now (this transfers the caller to the Help Desk personnel taking Help Desk calls), If you are calling to find out the status of a previously submitted requisition please press 2 (caller can then be transferred to the correct party or asked to leave information and have the call returned later), If you are calling to ask how to use a feature please press 3 (this can be transferred to your trainers or designers or another call processing menu set up for training purposes), if you are calling to place a new order please press 4 (this can then instruct the caller in how to fill out a telecommunications requisition), If you require training material press 5..."

The call process menu can be as simple or complex as you need it to be for your organization.

2 - The second critical item is to have staff answering the calls that can answer the calls and answer them correctly. If you have staff answering the Help Desk calls but they are not familiar with the system or its features, they can cause you more problems than they solve.

- Help Desk personnel should have available to them the necessary documentation and information to answer questions. They should know what the voice mail access numbers are, be able to look up different users profiles to see what it is they should have installed. As noted in the Telecommunications Management System chapter, the Help Desk should have direct access to the Trouble Reporting part of the system.

- You need to work out the details of how a reported trouble gets from the Help Desk to the proper staff that need to research the problems and get them fixed. Further, previously fixed or repaired problems should be accessible to the Help Desk personnel through a terminal on the telemanagement system. This will help aid in taking care of repeat calls to the desk.

- Where the Trouble Desk is located can also be a help or a hindrance. If you have space in the switch room, this proximity to the switch and the technical personnel can help answer and respond to problems that otherwise would require repeat calls.

- If you are using your Telemanagement system for tracking trouble calls, you should be able to generate reports that summarize what has been reported. Reviewing these reports will be very helpful in identifying potential system wide problems or trends that need to be given attention.

An efficiently and well run Trouble Desk can help eliminate many problems at the very beginning of the cutover process. If your Trouble Desk is not organized and staffed appropriately, although the cutover is going smoothly, you can leave the wrong impression with your user community if the Help Desk does not operate properly.

OTHER CUTOVER CONSIDERATIONS

- - Station placement takes several months to accomplish in any large project. Consider that you are installing thousands of stations and will have one in almost every office, laboratory and room on your campus. For your cutover to be fully successful, you must make sure that your local Telco and vendor have installed and fully tested all your trunks, DID, DOD, "Two Way" as well as your tie lines, well before the station placement starts. If you are getting a new exchange from your local carrier, it should be fully operative and in place around the country prior to your station installation, including the DID numbers you have contracted for. If you are installing a new DID exchange, I would take the extra step of having calls placed from around the country to your new system before it is cutover. You may be surprised to find areas around the country that do not recognize your telephone number. Better for you to find out and take care of the problem with your telco then to find out while you are in live operation.

- - Your vendor's Project Manager has several primary responsibilities to his employer, not the least of which is to bring your installation in on time and on budget, and not necessarily in that order. To do this, your vendor's Project Manager will take calculated steps and chances that may or may not have an effect on your successful cutover. Generally, one of the items under this person's control is the level and duration of the staffing estimated to bring the project in. Your job is to make sure your vendor informs you of their schedule to remove installation team staff, even if on a temporary basis, from the Project.

This schedule should have some solidly agreed upon milestones and fall back positions in case of problems. Otherwise you'll run the risk of finding yourself short staffed while there is still lots of work to be done. Once your vendor's staff have left the Project, getting them back in time to meet your needs and expectations is next to impossible.

If you do find yourself in the position of needing to bring staff back onto the Project for whatever reasons, try and get the original staff. This saves time and training efforts when you can least afford them.

The same philosophy holds true for the staff required to reconcile the entire Project's budget, changes from the original contract and equipment inventories. If the original staff, both yours and the vendors are not involved in the final reconciliation, it is likely that there will be problems and disagreements that will be almost impossible to settle to everyone's mutual satisfaction. Unfortunately not all agreements and

understandings get down in writing and you are forced to rely on your collective memories. Having the original parties absent from the final reconciliation makes it that much more difficult.

- • - The standard cutover day for most telecommunications systems has been a Friday night. Historically this was caused by the amount of manual and technical work required to be done to affect cutover. Moving and splicing cables, installing phones, turning on DID/DOD service and testing the system. I have heard many stories about weekend cutovers with staff working around the clock just to have panic set in at the last moment. In our case cutover was a non-event.

From the very beginning, based upon a recommendation from our consultant, we had planned on cutover to occur on a Thursday night so that we would have at least one day of full use on Friday. This would then give us the weekend to fix any major flaws or problems discovered under normal load conditions. With a Friday night cutover you have very little system use over the weekend and often do not find your problems till Monday when staff return and start to use the system. You then have very little time to react since you are now at the beginning of a work week and must operate under a fully loaded system.

Our non-event cutover went very well on September 1st, 1988. We had almost all of our stations installed, training for the new system had been in effect for a few weeks, incoming calls had been allowed since the first station was installed and the current Centrex system was still operational as a fall back system. In affect, all we had to do that Thursday night was to place several commands into a terminal opening up the outgoing trunks, DOD, so that the University could make calls off the campus.

- • - Our vendor set up this cutover event very nicely for the University. Our Project Manager had written out pieces of the necessary computer commands on separate index cards. He gave one card to each of his staff and that of the University. We all took turns keying in the commands to open the DOD and Two Way trunks. The whole affair took just minutes. A somewhat anticlimactic ending to about four years worth of effort, however, it did go smoothly and that's what counted.

- • - Our cutover had several first's for our local telco:
    - - We were asked if we wanted a male or female voice for our intercept message. We selected the male voice because we thought it would be more distinctive then the female, and to be a little different. However, we did not know how different we were. Our telco informed us that no one else in the city had ever used a male voice before for the intercept message. We also received complaints that the voice sounded gay.
    - - Although there were other customers of our telco that had digital trunks for DID, DOD and Two Way service, we were the largest co-located T1 customer in New York City that had ALL of its service on digital T1 Flexpath service.
    - - Digital Two Way trunks had not been used in any system of our vendor or in as large a quantity by our telco. The unique circumstances of Columbia and the new system capabilities of our switch and the tariffing of this service by our telco allowed us to perform this type of installation for the first time.
    - - Our combination of all digital Central Office trunking the and high rate of data traffic through the switched network were a unique combination for our telco. This unique combination also set us up for a unique set of problems for data error detection and repair as outlined above.
    - - We were terminating thousands of Centrex lines all at the same time, one of the largest termination orders ever received by our telco.

Cutovers are often traumatic occasions, some more so then others. If you plan and try to work out the details before hand, you can contribute substantially to the reduction of the cutover trauma. You are likely not going to eliminate all of it.

Chapter 12.

MISCELLANEOUS

This is the part of the book that I have placed all those items that I could not fit neatly into the previous chapters. If you have read this far, please continue and read the miscellaneous items in this chapter, they too will help you succeed in a number of ways in the overall installation process.

During the course of the installation you will undoubtedly require additional work that you did not previously think of, plan or require until the need actually arose. This may be as simple as a few additional wired jacks in a building you left out of the RFP or an entire street crossing. When making requests to your vendor for pricing of additional work (that's if it is not already in your ADD/DELETE price list), make sure you let them know by what date you need the work completed by. Otherwise, you may have a number of items that the vendor has agreed to do at an agreed to price, but maybe not in time for your scheduled cut over. If the price goes up because you need the work done sooner then later, you want to know before hand.

Now is the time to purchase those big ticket items that you did not think of before or considered until after the installation started. You will very likely not have as much money to spend again in a very long time, if ever. Your contingency budget will hopefully allow you some freedom you would not have had otherwise. Anything from good testing equipment, voice mail/processing/response systems, video/training tapes and hardware, upgrading your office and switch room furniture, innerduct in the spare street crossing conduits and office equipment are all good candidates for your funds.

Everyone I know that has gone through a project like this laments the same thing, "I wish I had placed everything in writing before hand." As much as I had placed in writing during the Project, I have the same lament. However, if you have read this book and noted the details, I think you will come to the same conclusion I have. That is, it is almost impossible to foresee all the problems and difficulties with sufficient clarity so as to get their potential solutions down in detail prior to the start of the Project. But those solutions that you do agree to, and those compromises that are made, need to be sufficiently documented for your company's future protection. Unofficial agreements and handshakes do not carry the ball when push comes to shove. Besides, the parties to these agreements are not always around when a problem arises and needs to be solved.

I CAN'T WATCH!

After you have spent as much time as you will preparing for the actual delivery of your system, you will likely want to be around when it actually arrives on site. I know I did. Our system delivery was scheduled for very early in the morning, between 5 and 6 am. The reasons for this early morning delivery time were:

- The delivery entrance for the University was generally a very busy area. Our delivery was to be in more then one truck and consisted of many pieces. We thought that the early morning delivery would help avoid problems with other deliveries and not delay the equipment from getting off the trucks to inside the switch room.

- The University had one main freight elevator to the main campus level to which the equipment had to be transported. The early morning delivery avoided any competition for the sole freight elevator.

- Since the delivery was going to be done on a week day and a day during the semester, the early morning delivery kept the onlookers and curiosity seekers out of the way and from under foot.

- The freight elevator was several hundred feet away from the building the equipment had to be delivered to. Further, the walk ways of the main campus level were made of cobble stone type bricks. I insisted that our newly delivered system not be subjected to the rock and role of the bumpy walk way. To smooth the way, the truckers had to lay down several hundred feet of plywood from the elevator to the building entrance where the switch was being delivered. This was accomplished more easily with fewer people around and no one to disturb the newly installed path.

When your brand new telecommunications equipment finally gets delivered, although you may want to watch and be present when it arrives, if you are faint of heart, you may be better off not watching. You may experience heart failure watching the

shippers move, bang, drop and generally rattle your new equipment as they move and squeeze it to its now home. None of this action is done on purpose to be sure, the generally large and bulky nature of this equipment makes handling otherwise difficult.

I know after watching our equipment get delivered, I thought it would never come up the first time around. I pictured all kinds of cards jarring loose and pieces dropping off. For the most part though, I was wrong.

To a certain extent I have to give credit to our vendors. Most of them seem to have come to grips with our nation's shipping industry and the methods used to move even delicate equipment. Most computer and electronic systems are packed in anticipation of such handling and take it pretty well. With all this said, it's still fun to be around when the equipment makes it's way on to your premises for the first time. Pictures of the actual delivery are also a good idea for publicity.

As with so many other aspects of the Project, your vendor may not know precisely when your system will get shipped and when it will arrive. Further, they may be surprised as to what is contained in a number of the boxes that do arrive. Cables may be missing, required books and technical guides may be missing and the ones you ordered for later delivery may have arrived early. After delivery and after reviewing what has arrived and what has not, a sanity check is probably a good idea. A careful inventory is a must.

OLD EQUIPMENT

One problem that we never resolved to anyone's real satisfaction was how to de-install, remove and get rid of the old telephone equipment. If you have your equipment on lease with some vendor, they will likely take the responsibility to de-install and remove it from your premises. But if you own the installed base, you may have a problem on your hands. The problems of how to handle your installed base become even more complicated if some of your equipment is leased while others are owned. You can be fairly sure that no one will know which is which.

We had several problems with the installed base of telephones that remained after the official cutover of the new telecommunications system:

- As with the initial installation of the new stations, access to locations to retrieve the old stations remained a major obstacle.

- Much of the installed base was old equipment and did not have a strong second hand market. Those offers we did receive from the used equipment market did not make it worth our while to take them up on the de-installation process which would have cost us more than we would get paid for the equipment.

- We had no good place to store the old equipment and no easy way to get rid of it either.

At this writing, the old telephone equipment was still installed and slowly disappearing from view. The plan was to hire a few students over time to go around and de-install the old equipment and try and sell it off piecemeal. That which could not be sold would be tossed. I am certain that there is a better way to dispose of this old telephone equipment than we came up with. However, there seemed to be so many obstacles for each alternative we had. I continue to see institutions with rooms or truck loads of old equipment they do not know what to do with. So much for modern disposal methods.

MY PERSONAL PROJECT MANAGEMENT SYSTEM

Your telecommunications project will literally have hundreds, and by the time your finished, maybe thousands of details for you to follow up on and keep track of. Many of you are computer users and will assume that you will use any one of many very good software packages for keeping track of these details. For some of you this may even work out very well. However, although I am quite well versed in the use of many software packages and an avid PC user, I am also the type of individual that needs to have as much information with me at all times and at all meetings I attend. This would be somewhat difficult to do with a computer project management system, even if it was running on a laptop computer.

I discovered a wonderfully simple project management tool on one of my business trips. I was scanning through an airline magazine when an ad from the Executive Gallery, Inc. caught my eye. They sell a variety of manual project management systems. They call them "ScanCard" organizing systems. The one I used was basically a three ring binder with several pages that are cut in such a way that allows you to place about 20 project cards on a page. The top of each project card is visible on the page which can then be scanned for special project notes. The system I used had four double sided pages plus, each cover of the binder was specially cut such that you could place 24 cards on each side in addition to an 8 1/2 X 11 inch pad. In this manner I had a total of almost 200 cards in a simple, slim three ring binder which I carried to all meetings and made all my meeting notes in. I would use a page for each one of my project managers and several for our vendor and used it to follow up on the assignments they had. This system, I think, drove my telecommunications vendor crazy. I never took a card out until the item was either completed or responded to by the vendor.

A computer system for tracking projects is great, but this simple system was more portable for me. I could take it home at night and weekends and update entries and make changes as needed. This system is not for everyone, but it allowed me to keep track of hundreds of details without them getting lost or misplaced until they were completed. The use of this ScanCard system in conjunction with the many computer related reports and databases we used were a perfect combination for my style of management.

For more information on the ScanCard systems, you can write to: The Executive Gallery, 2224 Speedball Road, Statesville, N.C. 28677-2000 or call 1-800-848-2618.

My last piece of miscellaneous advise pertains to preventing accidents from happening in the switch room. Having managed both computer centers and telecommunications switch rooms, I have learned that almost anything you can do to prevent an accident from happening is worth while. For some reason, visitors and technical staff alike can not help but play and press the various little switches and buttons on computer and telecommunications equipment. This idea is cheap and easy and should help avoid unnecessary accidents from this type of playing:

> - Buy several pieces of lucite plastic and velcro strips. Cut the lucite to a size just larger then the ON/OFF switches or buttons on your equipment and attach the lucite over the switch on the equipment using the strips of velcro. This will help prevent an accidental turning off of the power of the device and at the same time provide quick access to the ON/OFF switch if needed.

More recently I have seen companies offering to cut and sell just the right size lucite and velcro covers for this purpose. Doing it yourself may be just as easy.

WHEN IT IS OVER

As the Telecommunications Project at Columbia neared its completion, the mode of operation for the Team and the Telecommunications Department started to change. More and more the issues revolved around how to run the new system and the many polices that needed to be addressed that we had deferred till later. When later came, we had to finally address them.

The pressures, the highs and lows of installing your new system will be different from those that are involved in running it. The transition does not occur over night. It happens slowly, while you are still fighting the battles of the installation that continue for some time after the official cut over.

I found this transition period somewhat anticlimactic. After running full throttle for such a long period of time, the actual running of the new telecommunications system seems calmer, or at the very least, different. This is not to say that the day to day affairs of running a telecommunications system are boring, nor less important or in anyway less demanding than the installation was. Rather, the installation process itself does not prepare you for the re-entry into the daily affairs of your organization.

One way to help this transition period is to start it as early as you can before the end of the installation process. Although you have organized several times to this point, reorganize your department to the structure that will more closely support your new telecommunications system. Hire additional new personnel that will be needed. At this point assign task forces and committees to review any new issues and policies that will need to be addressed, put into place those procedures that will be required to accept new orders and perform move, add and change requests, and continue to actively communicate with your user community about plans and actions that will affect their use of the new system.

OFFICE OF TELECOMMUNICATIONS
FUNCTIONAL CHART
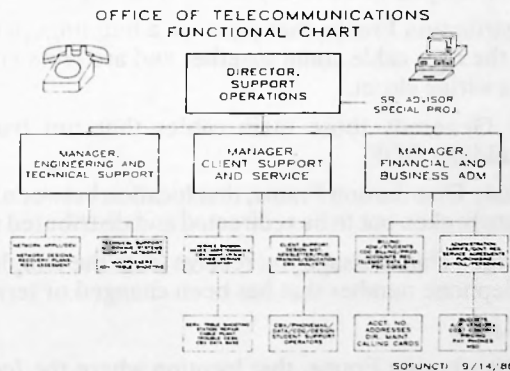
Taking these steps is no guarantee that you and your staff will have any easier a time during the transition period, but they should help contribute to it.

Good luck!

GLOSSARY OF KEY TERMS

A/B Jack - Also referred to as a voice/data jack, a duplex or dual outlet jack. Generally the physical devise in/on the wall that the station or telephone is connected to that then provides a path to the cable plant.

ACM - Asbestos Containing Material.

Two Way Trunks (Both Way Trunks) - Telephone company trunks connected to a PBX that can perform as either DID or DOD circuits depending upon service demand.

BDF - Building Distribution Frame, that place in a building where the main feeder cable and riser cables for a building come together and form the cross connects.

Cable Vault - Generally that location where the main feeder cables terminate prior to entering the switch room or Main Distribution Frame.

CTS - Columbia Telecommunications System, the official name of the telecommunications system.

DDD - Direct Distance Dialing, a telephone service which enables a user to dial long distance calls directly to telephones outside the user's local service area without the aid of an operator.

DID - Direct Inward Dialing, incoming calls are directed to the dialed telephone extension automatically, without the need for assistance from an operator.

DOD - Direct Outward Dialing, the ability to initiate a call from within your company's PBX without the assistance of an operator.

Down Load - The action of electronically transferring data and/or files from one computer system to another computer. Typically from a host/mainframe computer to another computer. When you down load you are receiving data.

FDF - Floor Distribution Frame, that place on a buildings particular floor where the station wire and the riser cable come together and are cross connected. An FDF is typically found in a wiring closet.

Feeder Plant - Generally those main cables that run from the main cable vault/MDF to the buildings BDF.

IDF - Intermediate Distribution Frame, that location between buildings where the feeder plant cables are broken out to be redirected and distributed to various locations.

Intercept Message - That message you receive from the telephone company when you have called a telephone number that has been changed or terminated.

Jack - See A/B Jack.

MDF - Main Distribution Frame, that location where the feeder cables and the cables going directly to your PBX are cross connected.

Other Common Carriers (OCC's) - Generally refers to companies other than AT&T that carry long distance calls.

Riser - That cable that generally runs up and down, vertically, in a building connecting the FDF's to each other and to the BDF.

SMDR - Station Message Detail Recording.

Station - A telephone.

Station Wire - The wire that runs from the jack to the FDF, generally considered the horizontal wiring in a building.

Switch Room - Generally, that space reserved for the location of the PBX. More and more this space is taking on the characteristics of a computer room.

Up Load - The action of electronically transferring data and/or files from one computer system to another computer. Typically from a host/mainframe computer to another computer. When you up load you are sending data.

Voice Mail - The electronic storage of recorded messages for later retrieval.

Wire Mold/Raceway - Lengths of metal or plastic that are attached to walls in which wire is run. Typically used to conceal and allow for neat and clean wiring installation in halls and offices.

ZEDIT

THE SOFTWARE ROSE

by Harry Newton
86 pages, 1988, $59.95 *Code P41015*

ZEdit is not only "our first software" but it is also the first front-end word processor and desktop publisher. The program has major advantages for people working on many projects at once — writing a letter, checking a phone number, proofing a report, composing a memo, etc. . .

Here are some of ZEdit's advantages:

● It's blazingly fast. It takes under a half second to go from the top to the bottom of a 200K file, or to find anything in a 200K file.

● It's easy to use with the pull-down menus, plus the Help screen you write yourself. Also there are keys that you can program yourself.

● ZEdit can act like other word processors (i.e. Wordstar Professional 4.0).

● You can load as many files as you have RAM. Hit one function button and move from one file to the next.

● You are able to move stuff between any of the files at any time.

● 8 windows can be available on the screen with each window having different files or different views of the same file. You can simultaneously edit the front, middle or end of a document.

● ZEdit is small. It's only 52K.

● ZEdit files are 100% straight ASCII. Every word processor in the world can read and write ZEdit files. You can feed ZEdit files into Pagemaker and Ventura.

● ZEdit has lots of fail-safe safeguards. It keeps a huge memory of all the stuff you've erased.

● ZEdit has big LAN (local area network) fail-safe features. If your LAN file server crashes while you're in ZEdit, no sweat. Change the name of the file you're working on and save it elsewhere.

● ZEdit is the perfect laptop computer program. It has an enormous cursor — one you can find on dismal laptop screens.

● ZEdit has its own built-in keyboard macro-making ability. You don't need SuperKey.

● ZEdit has lots of other useful features, such as the fact that ZEdit moves the text behind the cursor bar, rather than the other way around. Also, it has "intelligent" box drawing.

This book, along with all of the other books, comes with Harry Newton's old fashioned guarantee: **"If you are not 100% satisfied with ZEdit, I will personally refund all your purchase price, including tax."**

ZEdit: The Software Rose

It's hard to equate computer software with flowers, but Telecom does it in its ZEdit manual. "As you peel the petals, you discover more beauty (and more uses)," it says. Oddly, the analogy holds true.

ZEdit, the commercial version of the QEdit programmers' tool, is a combination low-end word processor, high-end editor, and daily organizer. Because ZEdit files are composed of straight ASCII characters, any standard word processor can read from and write to them, and any printer can print ZEdit files.

But keep peeling. ZEdit is not meant to be an expensive, full-blown word processor. Instead, it's a time-saver. It resides in RAM so it's incredibly fast. You can load as many files as your computer's memory will hold, and you can move data among files with ease. ZEdit lets you put up to eight windows onscreen, consisting of different files or multiple views of the same file. And because they are all ASCII, you can share files with anyone, send them over a network, or transmit them over any electronic mail system.

The ZEdit program will search your files for names, phone numbers, or any string of characters. It has easy-to-use pull-down menus, macro-making ability, and an extremely large cursor that's easy to see, especially on laptops. ZEdit is an ideal front-end word processor for desktop publishing programs. And if you want to get really fancy, you can use ZEdit to create your own keyboard commands and build a customized word processor.

ZEdit's only thorn is its documentation: although it's well written and more than adequate, it's a bit too technical for the casual user. Fortunately, the program is fairly easy to use; you can navigate through it mainly by using the Esc and arrow keys.

ZEdit asks only for 128KB of memory and DOS 2.0 or later. And best of all, it's priced at an affordable $59.95. For more information, contact Telecom Library Incorporated, in New York, at 212-206-6660.

—*Stuart Selber*

Zedit Offers Ease of Use, Speed in Compact Program

BY ROBERT SNOWDON JONES

Telecom Library Inc. recently released Zedit, a small, fast, $59.95 word processor with an interface that can be tailored to emulate more full-blown packages.

Billed as a "front end" for a word processor or desktop publishing program, Zedit lacks advanced formatting and printing features but is a compact 52K program that instead offers speed and ease of use, said Ron Acher, a Telecom Library spokesman.

The word processor comes configured to operate like Wordstar Professional or Word Perfect, but can be tailored to respond to word processor commands, Acher said. Zedit has a macro generator that permits one key to automate many tasks.

Telecom Library promotes Zedit as well-suited for laptops because of its small memory requirements and speed, as well as its oversize cursor that is easier to see on laptop screens, Acher said.

Zedit can handle as many files at once as memory permits, Acher said. Users can open eight editing windows on-screen at once to view eight different files or up to eight views of the same file. They can also copy and paste words between loaded files, he said. The program keeps all deletions of a session in memory and can restore them sequentially.
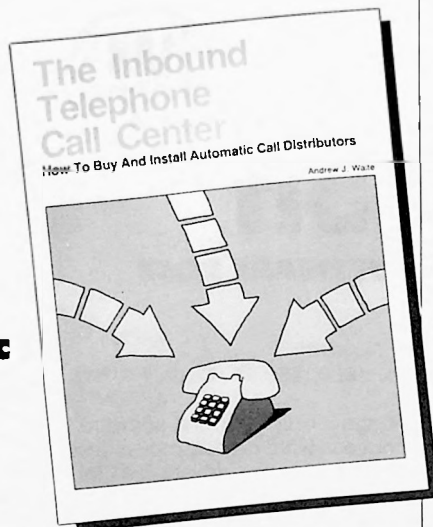
Telecom Library Inc., 12 W. 21 St., New York, NY 10010; (212) 691-8215.

Secrets Of Installing A Telephone System

How To Avoid The Pitfalls and Lessen the Pain

Secrets of Installing a Telephone System is the Ivy League's guide to setting up a state-of-the art line integrated voice data system. Neil Sachnoff, the man responsible for every aspect of Columbia University's recently completed TeleProject, details everything from the initial data collection survey, through the issuance of the RFP, to vendor selection and cut over.

This book organizes itself around the chronology of the Teleproject. Beginning with the recognition that voice, data, and computer functions are moving closer together, we see a world class research university make the transformation. The book deals with everything from the choosing the best switch design (we learn that it's the most powerful and versatile computer equipment you will ever buy) to the problems of gaining access to dorm rooms at 8:00 AM. Topics covered include:

- **Inside/Outside Plant Installation**
- **Switch Design and Function**
- **Switch room location and design**
- **Telecommunications Management Systems**
- **Training and Information Dissemination**

How to Install a Telecommunications System includes a glossary and is perfect for anyone involved in large scale network solutions. It's an informative and accessible read of a job well done.

The Author

Neil S. Sachnoff has over 15 years of practical MIS and telecommunications experience and is the owner and principal of the consulting firm, NSS Associates, a Telecommunications and Project Management business located in Englewood, NJ. Mr. Sachnoff was the director of the Information Services Support Operations Center for Computing Activities at Columbia University for ten years. During that tenure, he successfully directed the installation of a new university telecommunications system of over 10,000 lines covering 75 buildings.

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